SELECTED WATER RESOURCES ABSTRACTS

VOLUME 7, NUMBER 20
OCTOBER 15, 1974

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Rev. Aug 1974

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WATER RESOURCES ABSTRACTS

A Semimonthly Publication of the Water Resources Scientific Information Center,
Office of Water Resources Research, U.S. Department of the Interior

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The Secretary of the U. S. Department of the Interior has determined that the publication of this periodical is necessary in the transaction of the public business required by law of this Department. Use of funds for printing this periodical has been approved by the Director of the Office of Management and Budget through August 31, 1978.

As the Nation's principal conservation agency, the Department of the Interior has responsibility for most of our nationally owned public lands and natural resources. This includes fostering the wisest use of our land and water resources, protecting our fish and wildlife, preserving the environmental and cultural values of our national parks and historical places, and providing for the enjoyment of life through outdoor recreation. The Department assesses our energy and mineral resources and works to assure that their development is in the best interests of all our people. The Department also has a major responsibility for American Indian reservation communities and for people who live in Island Territories under U.S. administration.

FOREWORD

Selected Water Resources Abstracts, a semimonthly journal, includes abstracts of current and earlier pertinent monographs, journal articles, reports, and other publication formats. The contents of these documents cover the water-related aspects of the life, physical, and social sciences as well as related engineering and legal aspects of the characteristics, conservation, control, use, or management of water. Each abstract includes a full bibliographical citation and a set of descriptors or identifiers which are listed in the **Water Resources Thesaurus.** Each abstract entry is classified into ten fields and sixty groups similar to the water resources research categories established by the Committee on Water Resources Research of the Federal Council for Science and Technology.

WRSIC IS NOT PRESENTLY IN A POSITION TO PROVIDE COPIES OF DOCUMENTS ABSTRACTED IN THIS JOURNAL. Sufficient bibliographic information is given to enable readers to order the desired documents from local libraries or other sources.

Selected Water Resources Abstracts is designed to serve the scientific and technical information needs of scientists, engineers, and managers as one of several planned services of the Water Resources Scientific Information Center (WRSIC). The Center was established by the Secretary of the Interior and has been designated by the Federal Council for Science and Technology to serve the water resources community by improving the communication of water-related research results. The Center is pursuing this objective by coordinating and supplementing the existing scientific and technical information activities associated with active research and investigation program in water resources.

To provide WRSIC with input, selected organizations with active water resources research programs are supported as "centers of competence" responsible for selecting, abstracting, and indexing from the current and earlier pertinent literature in specified subject areas.

Additional "centers of competence" have been established in cooperation with the Environmental Protection Agency. A directory of the Centers appears on inside back cover.

Supplementary documentation is being secured from established discipline-oriented abstracting and indexing services. Currently an arrangement is in effect whereby the BioScience Information Service of Biological Abstracts supplies WRSIC with relevant references from the several subject areas of interest to our users. In addition to Biological Abstracts, references are acquired from Bioresearch Index which are without abstracts and therefore also appear abstractless in SWRA. Similar arrangements with other producers of abstracts are contemplated as planned augmentation of the information base.

The input from these Centers, and from the 51 Water Resources Research Institutes administered under the Water Resources Research Act of 1964, as well as input from the grantees and contractors of the Office of Water Resources Research and other Federal water resources agencies with which the

Center has agreements becomes the information base from which this journal is, and other information services will be, derived; these services include bibliographies, specialized indexes, literature searches, and state-of-the-art reviews.

Comments and suggestions concerning the contents and arrangements of this bulletin are welcome.

Water Resources Scientific Information Center
Office of Water Resources Research
U.S. Department of the Interior
Washington, D. C. 20240

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SELECTED WATER RESOURCES ABSTRACTS

2. WATER CYCLE

2A. General

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Transport and Road Research Lab., Crowthorne (England).
For primary bibliographic entry see Field 4A.
W74-10432

THE ANALYSIS OF SOME MONTHLY HYDROLOGIC TIME SERIES,
Idrutecneco, San Lorenzo in Campo (Italy).
L. Torelli.
Journal of Hydrology, Vol 21, No 3, p 269-290, 1974. 7 fig, 3 tab, 9 ref.

Descriptors: *Time series analysis, *Monthly, *Temperature, *Precipitation(Atmospheric), *Streamflow, Hydrographs, *Mathematical models, *Illinois.
Identifiers: Urbana(Ill), Morrisonville(Ill), Sangamon River(Ill), Monticello(Ill), Italy, Netherlands.

The following time series are analyzed: monthly average temperatures at Urbana, Illinois (1915-1965); monthly precipitations at Morrisville, Illinois (1896-1969); and monthly streamflows in the Sangamon River at Monticello, Illinois (1915-1969). The model was previously identified and showed that a simple transformation makes the series stationary. The analysis was completed. By a joint use of spectral and regression analysis one arrives at the formulation of models in which the deterministic process and the variaces are described by means of trigonometric functions. This allows a considerable economy of parameters in comparison with the models based on the 24 sample monthly averages and variances. The practical advantages of such an economy of parameters are discussed. (Merritt-FIRL)
W74-10606

PROBLEMS OF THE EFFECT OF HUMAN ACTIVITY ON WATER RESOURCES AND WATER REGIME (VOPROSY VLIYANIYA KHOZYAYSTVENNOY DEYATEL'NOSTI NA VODNYYE RESURSY I VODNYY REZHIM),
Gusudarstvennyi Gidrologicheskii Institut, Leningrad (USSR).
For primary bibliographic entry see Field 4C.
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PHOTO-HYDROLOGICAL RECONNAISSANCE SURVEYS,
International Inst. for Aerial Survey and Earth Sciences, Enschede (Netherlands).
For primary bibliographic entry see Field 7B.
W74-10648

AN INTEGRATED MODEL OF STORM-GENERATED WAVES,
Virginia Univ., Charlottesville. Dept. of Environmental Sciences.
For primary bibliographic entry see Field 2E.
W74-10653

AN ESTIMATE OF LEAKAGE FROM BLACKFOOT RESERVOIR TO BEAR RIVER BASIN, SOUTHEASTERN IDAHO,
Geological Survey, Tacoma, Wash.
For primary bibliographic entry see Field 4A.
W74-10661

RANGELAND HYDROLOGY,
Geological Survey, Denver, Colo.
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W74-10682

A COMPARISON OF PHYSICALLY-BASED INFILTRATION EQUATIONS,
Agricultural Research Council, Cambridge (England). Unit of Soil Physics.
For primary bibliographic entry see Field 2G.
W74-10823

2B. Precipitation

A TWO-DIMENSIONAL WARM FOG MODIFICATION MODEL,
Geomet, Inc., Rockville, Md.
D. J. Moschandreas, R. T. Chu, and S. D. Thayer.
Available from NTIS, Springfield, Va. 22161 as AD-773 637, Price $4.00 printed copy; $2.25 microfiche. GEOMET Report No EF-295, December 31, 1973. 91 p, 22 fig, 12 tab, 26 ref, 2 append. ONR Contract N00014-70-C-0371.

Descriptors: *Weather modification, *Fog, *Cloud seeding, *Mathematical models, Simulation analysis, Advection, Mixing, Turbulence, Model studies.
Identifiers: *Warm fog, Fog dissipation.

The interaction between fog and stratus nuclei and the ambient environment was studied using a two-dimensional model. Numerical experiments simulated the dissipation of fog by seeding with hygroscopic particles. The simulation model likely to be significant, includes turbulent diffusion and advection by horizontal wind. As input it requires parameter values for the fog (droplet size and number concentration, nuclei size and chemical properties, and liquid water content) and the environment (temperature, pressure, supersaturation, specific humidity, horizontal wind speed, and vertical and horizontal turbulent diffusion coefficients). Also required are input for the initial values of the seeding material (particle size distribution, concentration, and chemical properties). The model generates the time history of the size and number concentration of seeding drops, and of the fog droplets, the liquid water content, supersaturation, and visibility. Seeding with hygroscopic particles improves the visibility of the fog layer; however, the extent of this improvement strongly depends on the environmental conditions and the characteristics of the seeding particles. (Knapp-USGS)
W74-10359

PRECIPITATION PROBABILITIES FOR EAST TENNESSEE,
Tennessee Univ., Knoxville. Dept. of Plant and Soil Science.
H. A. Fribourg, R. H. Strand, J. V. Vaiksnoras, and J. M. Safley, Jr.
Agricultural Experiment Station Bulletin 512, May 1973. 39 p, 1 fig, 29 tab, 16 ref. OWRR A-017-TENN(3).

Descriptors: *Precipitation(Atmospheric), *Probability, *Tennessee, Frequency analysis, Meteorological data, Weather data, Forecasting, Weather patterns.

Precipitation probabilities are compiled for the eastern part of Tennessee. For each site a table is presented which contains precipitation probabilities at selected levels of precipitation for 1-, 2-, and 4-week periods. The precipitation levels for which probabilities were computed are: at least 0.25, 0.50, 1.00, 1.50, 2.00 and 3.00 inches for 1-week periods; 0.50, 1.00, 1.50, 2.00, 3.00 and 5.00 inches for 2-week periods; and 1.00, 2.00, 3.00, 5.00 and 6.00 inches for 4-week periods. In each probability table, the mean weekly total precipitation for each 1-, 2- and 4-week period is shown for the period of record studied. (See also W74-10400 and W74-10401) (Knapp-USGS)
W74-10399

PRECIPITATION PROBABILITIES FOR MIDDLE TENNESSEE,
Tennessee Univ., Knoxville. Dept. of Plant and Soil Science.
R. H. Strand, H. A. Fribourg, and J. V. Vaiksnoras.
Agricultural Experiment Station Bulletin 511, May 1973. 38 p, 1 fig, 28 tab, 16 ref. OWRR A-017-TENN(2).

Descriptors: *Precipitation(Atmospheric), *Probability, *Tennessee, Frequency analysis, Meteorological data, Weather data, Forecasting, Weather patterns.

Precipitation probabilities are compiled for the central part of Tennessee. For each site a table is presented which contains precipitation probabilities at selected levels of precipitation for 1-, 2-, and 4-week periods. The precipitation levels for which probabilities were computed are: at least 0.25, 0.50, 1.00, 1.50, 2.00 and 3.00 inches for 1-week perios; 0.50, 1.00, 1.50, 2.00, 3.00, and 5.00 inches for 2-week periods; and 1.00, 2.00, 3.00, 4.00, 5.00, and 6.00 inches for 4-week periods. In each probability table, the mean weekly total precipitation for each 1-, 2-, and 4-week period is shown for the period of record studied. (See also W74-10399) (Knapp-USGS)
W74-10400

PRECIPITATION PROBABILITIES FOR WEST TENNESSEE,
Tennessee Univ., Knoxville. Dept. of Plant and Soil Science.
H. A. Fribourg, R. H. Strand, and J. V. Vaiksnoras.
Agricultural Experiment Station Bulletin 510, May 1973. 27 p, 1 fig, 19 tab, 16 ref. OWRR A-017-TENN(1).

Descriptors: *Precipitation(Atmospheric), *Probability, *Tennessee, Frequency analysis, Meteorological data, Weather data, Forecasting, Weather patterns.

Precipitation probabilities are compiled for the western part of Tennessee. For each site a table is presented which contains precipitation probabilities at selected levels of precipitation for 1-, 2-, and 4-week periods. The precipitation levels for which probabilities were computed are: at least 0.25, 0.50, 1.00, 1.50, 2.00, and 3.00 inches for 1-week periods; 0.50, 1.00, 1.50, 2.00, 3.00, and 5.00 inches for 2-week periods; and 1.00, 2.00, 3.00, 4.00, 5.00, and 6.00 inches for 4-week periods. In each probability table, the mean weekly total precipitation for each 1-, 2-, and 4-week period is shown for the period of record studied. (See also W74-10399) (Knapp-USGS)
W74-10401

TECHNICAL BASIS FOR INTERIM REGIONAL TORNADO CRITERIA,
Atomic Energy Commission, Washington, D.C. Office of Regulation.
E. H. Markee, Jr., J. G. Beckerley, and K. E. Sanders.
Report WASH-1300, May 1974. 23 p, 8 fig, 5 tab, 19 ref.

Descriptors: *Tornadoes, *Nuclear powerplants, *Risks, *Design storm, Design safety, Design standards, Public health, Winds, United States, *Weather forecasting.

A regionalized design tornado for predicting risks to nuclear powerplants was calculated for the contiguous United States. From an analysis of tornado classification data from the National Weather Service Offices for 1971 and 1972 and tornado occurrence data, it was concluded that three general regions with associated tornado severity and frequency of occurrence could be determined. Probable windspeeds were calculated, and cor-

responding pressure drops and rates of pressure drop were determined from the cyclostrophic equation. The numerical values for these tornado properties are considered as conservative upper bounds. The values should be lowered as may be justified when sufficient data become available. (Knapp-USGS)
W74-10433

VALIDITY OF THE MODIFIED BILHAM EQUATION,
West Riding County Council, Yorkshire (England). Highways and Bridges Dept.
R. G. Ashworth, and C. A. O'Flaherty.
Institution of Municipal Engineers, Vol 101, No 2, p 43-50, February, 1974. 12 fig, 15 ref.

Descriptors: *Rainfall intensity, *Forecasting, Storms, *Drainage systems, *Design.
Identifiers: *Bilham Equation, Isopleth diagrams, *United Kingdom(England).

The validity of the modified Bilham equation was investigated to illustrate the extent to which rainfall intensities associated with different storm durations and return periods can vary in England. The results indicate that the modified Bilham relationship can give intensity results for particular areas of the country which are significantly different from the true values. This can result in the overdesign or underdesign of drainage facilities. To minimize the wastage drainage facilities, more emphasis should be placed on local conditions. Government guidelines should be compared with that given for the locality in the appropriate isopleth diagram. If the two values differ significantly, the Meteorological Office should be consulted regarding the advisability of using local rainfall data to determine more appropriate intensity values. (Merritt-FIRL)
W74-10572

THE ANALYSIS OF SOME MONTHLY HYDROLOGIC TIME SERIES,
Idrutecneco, San Lorenzo in Campo (Italy).
For primary bibliographic entry see Field 2A.
W74-10606

LABORATORY INVESTIGATION OF ELECTRICAL DISSIPATION OF WARM FOG,
Naval Postgraduate School, Monterey, Calif.
For primary bibliographic entry see Field 3B.
W74-10623

EVALUATION OF A METHOD OF FOG DISPERSAL BY IONIZATION,
California State Div. of Highways, Sacramento. Transportation Lab.
For primary bibliographic entry see Field 3B.
W74-10639

EVALUATION OF A HOLLOW SPHERICAL CAVITY WITH A CIRCULAR APERTURE AS A REMOTE SENSOR OF ATMOSPHERIC INDEX OF REFRACTION,
Texas Univ., Austin. Antennas and Propagation Lab.
For primary bibliographic entry see Field 7B.
W74-10649

VERIFICATION OF RAINFALL ESTIMATES: AN ANALYSIS OF ACTIVATION PATTERNS OF ADSID AND ACOUSID SEISMIC AND ACOUSTIC INTRUSION SENSORS TO DETERMINE RAINFALL RATES,
Elgin AFB Fla. Air Weather Service.
D. H. Kampwerth, and R. A. Rasmussen.
Available from NTIS, Springfield, Va 22161 as AWS-TR-74-253 Price $3.00 printed copy; $2.25 microfiche. Air Force Air Weather Service (MAC) Technical Report 74-253, February 1974. 36 p, 16 fig, 1 tab.

Descriptors: *Rainfall intensity, *Remote sensing, *Seismic studies, *Instrumentation, Military aspects, Meteorological data, Data collections.
Identifiers: *Seismic sensors, Air Weather Service(USAF).

Rainfall rates were determined from the activation patterns of seismic and acoustic intrusion sensors at Eglin AFB, Florida in the fall of 1972. Sensor activations were recorded, analyzed, and compared with rainfall rates as determined from recording rain gages collocated with the sensor strings. In nine tests, definite sensor activation patterns were correlated with rainfall rates. Scatter diagrams were prepared and analyzed to summarize sensor activation/rainfall rate comparison. (Knapp-USGS)
W74-10674

A HISTORY OF AIR WEATHER SERVICE WEATHER MODIFICATION, 1965-1973,
For primary bibliographic entry see Field 3B.
W74-10675

OPTICAL HOLOGRAPHY APPLICATIONS FOR THE ZERO-G ATMOSPHERIC CLOUD PHYSICS LABORATORY,
National Aeronautics and Space Administration, Huntsville, George C. Marshall Space Flight Center.
R. L. Kurtz.
Available from NTIS, Springfield, Va 22161 as NASA TR R-424 Price $4.00 printed copy; $2.25 microfiche. National Aeronautics and Space Administration Technical Report R-424, May 1974. 71 p, 19 fig, 1 tab, 12 ref, append.

Descriptors: *Cloud physics, *Model studies, *Data collections, *Photography, Atmospheric physics, Clouds, Meteorology, Laboratory tests.
Identifiers: *Holography, *Lasers.

A holographic arrangement is proposed for application to the detection of particle size distribution in an atmospheric simulation cloud chamber. In this chamber particle growth rate is investigated; therefore, the proposed holographic system must capture continuous particle motion in real time. A complete description of holography is provided, both for the time-dependent case of moving scene holography and for the time-independent case of stationary holography. (Knapp-USGS)
W74-10679

RADAR IN WEATHER MODIFICATION AND HAIL CONTROL,
For primary bibliographic entry see Field 3B.
W74-10687

2C. Snow, Ice, and Frost

A SIMPLIFIED MATHEMATICAL MODEL OF AVALANCHE MOVEMENT (UPROSHCHENNAYA MATEMATICHESKAYA MODEL' DVIZHENIYA LAVINY),
Moscow State Univ., (USSR). Problemnaya Laboratoriya Nezhnykh Lavin i Selei.
V. A. Svetlosanov.
Vestnik Moskovskogo Universiteta, Seriya V, Geografiya, No 2, p 110-112, March-April 1974. 2 fig.

Descriptors: *Mathematical models, *Avalanches, *Snow, Movement, Volume, Mass, Density, Slopes, Mountains, Equations.
Identifiers: USSR.

A mathematical model of avalanche movement down a mountain slope is described. The space occupied by snow along a mountain slope is arbitrarily divided into three parts: the x-part of the volume, which is at rest; the y-part, which is set in motion; and the z-part, which is excluded from the movement process. Analytical expressions are given for x, y, and z in the case of the coefficient of interaction between the moving mass of snow and that in the state of rest. The model can be used to determine the volume of a released avalanche as a function of initial conditions, mean angle of the mountain slope, and state of the snow. (Josefson-USGS)
W74-10377

RAIOCARBON IN GLACIAL WATER OF THE EL'BRUS REGION (RADIOUGLEROD V LEDNIKOVOY VODE PRIEL'BRUS'YA),
Akademiya Nauk URSR, Kiev. Institut Geokhimii i Fiziki Mineralov.
For primary bibliographic entry see Field 2K.
W74-10380

PHYSICS OF SNOW AND ICE (FIZIKA SNEGA I L'DA),
V. P. Gavrilo.
Akademiya Nauk SSSR Vestnik, No 4, p 125-126, April 1974.

Descriptors: *Conferences, *Snow, *Ice, Physics, Physical properties, Mechanical properties, Glaciers.
Identifiers: *USSR.

A symposium, devoted to results of recent investigations of snow and ice by electromagnetic, optical, dynamic, and static methods, was held in Leningrad, October 1-5, 1973. The symposium was sponsored by the Arctic and Antarctic Scientific Research Institute of the Hydrometeorological Service and by the Interdepartmental Commission on the Study of the Antarctic of the USSR Academy of Sciences. Participants in the symposium included about 200 representatives of 47 organizations in the USSR and guests from scientific institutes in England, Australia, Norway, the United States, France, the German Federal Republic, Czechoslovakia, and Switzerland. A total of 46 papers were presented. Attention was directed to the use of radar to study glaciers and ice of maritime and freshwater seas. New experimental data on physical properties of snow and ice in the optical range showed the importance of further development of investigations in this field. A large number of papers were devoted to methods and results of investigations of the mechanical and acoustic properties of ice and snow. (Josefson-USGS)
W74-10385

SNOW ROAD CONSTRUCTION TECHNIQUE BY LAYERED COMPACTION OF SNOW-BLOWER PROCESSED SNOW,
Naval Civil Engineering Lab., Port Hueneme, Calif.
For primary bibliographic entry see Field 8G.
W74-10403

COMPUTER SIMULATION OF SNOWMELT WITHIN A COLORADO SUBALPINE WATERSHED,
Forest Service (USDA), Fort Collins, Colo. Rocky Mountain Forest and Range Experiment Station.
C. F. Leaf, and G. E. Brink.
Research Paper RM-99, February 1973. 22 p, 15 fig, 1 tab, 12 ref, append.

Descriptors: *Snowmelt, *Mathematical models, *Runoff forecasting, *Computer programs, Colorado, Systems analysis, Simulation analysis, Alpine, Snowpacks, Watershed management, Forest management.
Identifiers: Fraser Experimental Forest(Colo).

A dynamic model simulates snowmelt in Colorado subalpine watersheds for all combinations of aspect, slope, elevation, forest cover composition, and forest density. The model simulates winter snow accumulation, the energy balance, snowpack

condition, and resultant melt in time and space. Detailed flow chart descriptions of the various components of the model and a program listing are presented. The model was tested on field data obtained from the 667-acre Deadhorse Creek watershed at the Fraser Experimental Forest, Colorado. Snowmelt rates at eight locations on Deadhorse Creek were reconstituted. Agreement between observed and simulated melt rates was good at all locations. The model is structured so that a minimum number of variables must be adjusted to obtain a satisfactory fit. In this case, only two variables were adjusted to obtain satisfactory agreement: (1) cover density (a vegetation type and composition parameter), and (2) a shortwave radiation transmissivity coefficient. (Knapp-USGS)
W74-10424

SEA ICE CONDITIONS IN THE COOK INLET, ALASKA DURING THE 1971-72 WINTER,
National Weather Service, Anchorage, Alaska.
R. J. Hutcheon.
Available from NTIS, Springfield, Va. 22161 as COM-73-10773, Price $3.00 printed copy; $2.25 microfiche. Technical Memorandum NWS AR-8, April 1973. 17 p, 2 fig, 3 tab.

Descriptors: *Sea ice, *Estuaries, *Fjords, *Alaska, Ice cover, Freezing, Weather, Temperature.
Identifiers: *Cook Inlet(Alaska).

In Cook Inlet, Alaska, the development of ice began slowly during the late fall of 1971, but persistent below-normal temperatures during January, February, and March of 1972 resulted in a long and rough ice year. By the end of March, accumulation of ice was almost as great as the seasonal ice accumulation of a winter in the coldest 10% of winters of record. Below-normal temperatures throughout April and during the first part of May resulted in a slow decrease in the ice during the spring. (Knapp-USGS)
W74-10428

RELIABILITY OF SNOWMELT RUNOFF PREDICTIONS BASED ON MASS BALANCE PROCEDURES VERSUS INDEX METHODS,
Wyoming Univ., Laramie. Water Resources Research Inst.
V. E. Smith, L. R. Bartos, and P. A. Rechard.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-234 427, $3.75 in paper copy, $2.25 in microfiche. Completion Report, Water Resources Series No. 42, December 1973. 68 p, 16 fig, 26 tab, 19 ref. OWRR C-3129 (No 3690)(2).

Descriptors: *Snow surveys, *Snow cover, Snowpacks, *Runoff forecasting, Measurement, *Wyoming, Alpine, Small watersheds, Sampling, Reliability, Stratification.
Identifiers: *Snow density, *Snow depth, *Mass balance procedures, Snow index method.

Extensive measurements of snow water equivalent, depth density and runoff were made in the late winter and spring of 1972 and 1973 on a small subalpine watershed in Wyoming. Stratification of areas within the basin, particularly forested to non-forested, was found to be necessary. After ablation began, elevation stratification was also necessary. Areas subject to high winds had large depth variations, requiring large sample sizes. A sampling procedure was developed from which fairly good estimates of water equivalent in the basin were obtained. The procedure appears to be applicable to snow pack determinations for short range runoff forecasting.
W74-10536

LOW WINTER DISSOLVED OXYGEN IN SOME ALASKAN RIVERS,
Environmental Protection Agency, College, Alaska. Arctic Environmental Research Lab.
For primary bibliographic entry see Field 5B.
W74-10546

BIOLOGICAL TREATMENT OF AIRPORT WASTEWATER CONTAINING AIRCRAFT DE-ICING FLUIDS,
Environmental Protection Service, Burlington (Ontario). Wastewater Technology Centre.
For primary bibliographic entry see Field 5D.
W74-10552

OZONE TREATS ARCTIC WATERS,
Arctic Health Research Centre, College, Alaska. Environmental Sciences Branch.
For primary bibliographic entry see Field 5F.
W74-10556

ICE RIFTER,
R. W. Worthing.
U S Patent No 3,807,180, 4 p, 5 fig, 4 ref; Official Gazette of the United States Patent Office, Vol 921, No 5, p 1809, April 30, 1974.

Descriptors: *Patents, *Iced lakes, Equipment, Navigation.
Identifiers: *Ice breakers, Ice breakup.

The ice rifter is a submersible ice breaker which consists of a platform supported by a buoyant device. The platform may be submerged by varying the buoyancy of ballast tanks. Piercing or perforating devices affixed along at least one edge of the platform are directed towards the ice to weaken or perforate the ice. A pair of hydraulic pistons disposed on opposite sides of a centerline of the platform and pivotally connected at their free ends may be equally energized to lift the ice above the level of adjacent ice. One of the pistons may be energized more than the other to tilt the platform so that the ice may slide onto the adjacent remaining ice. (Sinha-OEIS)
W74-10578

REGIME OF SNOW-AVALANCHE DESCENT IN NORTHERN TRANSBAYKAL (REZHIM SKHODA SNEZHNYKH LAVIN NA SEVERE ZABAYKAL'YA),
Institute of Geography of Siberia and the Far East, Irkutsk (USSR).
V. R. Alekseyev, and A. V. Kirichenko.
Institut Geografii Sibiri i Dal'nego Vostoka Doklady, No 35, p 40-49, 1972. 2 fig, 4 tab, 10 ref.

Descriptors: *Avalanches, *Snow, Movement, *Mountains, *Slopes, Snowfall, Storms, Thawing, Seasonal, Mapping.
Identifiers: *USSR(Transbaykal), Isolines.

The status of investigations of snow avalanches in Northern Transbaykal is examined, and data are presented on release of snow from slopes on the Yuzhno-Muya and Udokan mountain ridges. A relation is established between avalanche descent and snowfalls, snowstorms, and thawing. Mountainous regions of Northern Transbaykal are characterized by a high degree of avalanche hazard. Most snow avalanches occur in March, April, and May and, occasionally, in October and June. In high-mountain regions, release of snow is possible at any time. Construction in mountainous regions should be preceded by special snow-avalanche work, accompanied by a study of snow-avalanche descent conditions and by compilation of maps of avalanche danger. The problem of organizing a special snow-avalanche station is discussed in connection with the proposed reclamation of the area. (Josefson-USGS)
W74-10625

A RESEARCH HYDRAULIC FLUME FOR MODELING DRIFTING SNOW - DESIGN, CONSTRUCTION AND CALIBRATION,
Cold Regions Research and Engineering Lab., Hanover, N.H.
D. J. Calkins.
Technical Report 251, June 1974. 14 p, 12 fig, 10 ref.

Descriptors: *Hydraulic models, *Flumes, *Snow cover, *Sediment transport, *Sedimentation, Snow, Sedimentary structures, Snow management, Model studies.
Identifiers: Snow drifting.

To model drifting snow, a fluvial bed hydraulic flume was designed and constructed. Each section has bolted connections which allow flexibility if a section needs to be modified. For example, glass viewing panels are individually clamped at the top so a single sheet can be replaced with minimal difficulty. The operation of the flume facility was designed to be simple. Three butterfly valves control the operation of the storage tank system, and a variable-speed control on the pump-motor unit permits a wide range of flow velocities for any given depth. The discharge can be monitored continuously from a differential-pressure transducer which is connected to the venturi. Ease of operations allows for a greater flexibility in the design of experiments. (Knapp-USGS)
W74-10644

EQUIPMENT FOR MEASURING THE WATER PERMEABILITY AS A FUNCTION OF DEGREE OF SATURATION FOR FROST SUSCEPTIBLE SOILS,
Massachusetts Inst. of Tech., Cambridge.
For primary bibliographic entry see Field 2G.
W74-10657

AREAL SNOWPACK WATER-EQUIVALENT DETERMINATIONS USING AIRBORNE MEASUREMENTS OF PASSIVE TERRESTRIAL GAMMA RADIATION,
EG and G, Inc., Las Vegas, Nev.
E. B. Jones, A. E. Fritzsche, Z. G. Burson, and D. L. Burge.
Available from NTIS, Springfield, Va. 22161 as Conf-73-1201-1, Price $3.00 printed copy; $2.25 microfiche. Reprint of Paper presented at the Interdisciplinary Symposium on Advanced Concepts and Techniques in the Study of Snow and Ice Resources, December 2-6, 1973, Monterey, Calif. 10 p, 2 fig, 3 tab, 11 ref.

Descriptors: *Snow surveys, *Water equivalent, *Snowpacks, *Remote sensing, *Gamma rays, Nuclear moisture meters, Calibrations, Data collections, Water yield, Runoff forecasting.

Airborne measurement of the water equivalent of snow by the terrestrial gamma attenuation method is accurate to 10%. Airborne survey data from study areas in the midwest show that airborne radon-daughters, soil moisture, and gamma counting statistics are the predominant sources of error. The method has good potential for large, rapid areal measurements of water equivalent over flat or rolling terrain. (Knapp-USGS)
W74-10681

HYDROSTRATIGRAPHIC UNITS OF SURFICIAL DEPOSITS OF EAST-CENTRAL ILLINOIS,
Illinois Univ., Urbana. Dept. of Geology.
For primary bibliographic entry see Field 2J.
W74-10852

2D. Evaporation and Transpiration

TOWARD THE STRUCTURE OF A PRODUCTION FUNCTION FOR WHEAT YIELDS WITH DATED INPUTS OF IRRIGATION WATER,
Indian Statistical Inst., New Delhi. Planning Unit.
For primary bibliographic entry see Field 3F.
W74-10600

IRRETRIEVABLE RUNOFF LOSSES OF THE VOLGA RIVER THROUGH EVAPORATION FROM RESERVOIRS OF THE VOLGA-KAMA CASCADE (BEZVOZVRATNYYE POTERI STOKA R. VOLGI ZA SCHET ISPARENIYA S VODOKHRANILISHCH VOLZHSKO-KAMSKOGO KASKADA),
Gosudarstvennyi Gidrologicheskii Institut, Leningrad (USSR).
For primary bibliographic entry see Field 4A.
W74-10628

REFLECTANT INDUCED MODIFICATION OF SOYBEAN CANOPY RADIATION BALANCE: 1. PRELIMINARY TESTS WITH A KAOLINITE REFLECTANT,
Nebraska Univ., Lincoln. Dept. of Agricultural Climatology.
P. C. Doraiswamy, and N. J. Rosenberg.
Agronomy Journal, Vol 66, p 224-228, March-April 1974. 5 fig, 3 tab, 14 ref. OWRR A-017-NEB (7).

Descriptors: *Solar radiation, *Energy budget, *Soybeans, *Evapotranspiration, *Water balance, Water conservation, Consumptive use, Crop response, Radiation, Albedo, Microenvironment, Kaolinite.

Soybeans were coated with kaolinite to test whether reflection of incident solar radiation can be effectively increased in the field. Increased reflection reduces the amount of radiant energy available and hence reduces the quantity of water consumed by transpiration. Total reflection (300 to 3,000 nm) from the coated crop was increased by about 8%. Net radiation was decreased by about 8%. Spectral reflection was increased primarily in the visible range (380 to 750 nm). Differences in'0 reflection were minor in the near infrared range (750 to 1,150 or 1,550 nm). Treatment caused some redistribution of light onto the lower canopy. (Knapp-USGS)
W74-10668

RANGELAND HYDROLOGY,
Geological Survey, Denver, Colo.
For primary bibliographic entry see Field 4A.
W74-10682

A QUICK-WEIGHING LYSIMETER SYSTEM CHECK,
Agricultural Research Service, Prosser, Wash. Irrigated Agriculture Research and Extension Center.
For primary bibliographic entry see Field 7B.
W74-10749

CALCULATION OF EVAPORATION FROM MEASUREMENTS OF SOIL WATER AND THE SOIL WATER CHARACTERISTIC,
Guelph Univ. (Ontario). School of Engineering.
W. N. Stammers, O. C. Igwe, and H. R. Whiteley.
Canadian Agricultural Engineering, Vol 15, No 1, p 2-5, June, 1973. 6 tab, 5 ref.

Descriptors: *Evaporation, *Soil surfaces, Evapotranspiration, Soil moisture, *Soil water, Soil types, Mathematical models.

An approach based on the existence of a plane of zero soil-water flux is used to develop a model for calculating evaporation from soil-water measurement. The information required is a knowledge of soil water, capillary potential relationships for the soil considered, and soil-water content at the beginning and end of each time period of evaporation computation. This approach yields results that do not differ significantly from those obtained by assuming a fixed soil depth for calculations and ignoring soil-water seepage. (Skogerboe-Colorado State)
W74-10758

THE EFFECTS OF TRANSVERSE CUTS THROUGH THE STEMS OF TRANSPIRING WOODY PLANTS ON WATER TRANSPORT AND STRESS IN THE LEAVES,
Commonwealth Scientific and Industrial Research Organization, Melbourne (Australia). Forest Products Lab.
J. F. G. MacKay, and P. E. Weatherly.
J Exp Bot. Vol 24, No 78, p 15-28. 1973. Illus.
Identifiers: *Acer-pseudoplatanus, *Gossypium-hirsutum, *Leaves(Moisture stress), Stems, Temperature, Transverse cuts, *Woody plants, *Transpiration.

Both single and double-overlapping transverse cuts were made in the stems of transpiring plants (Acer pseudoplatanus and Gossypium hirsutum) and their effects on transpiration and water stress in the leaves studied. Water stress was measured as depression of water potential and beta-gauge reading. Results were similar with both species. Single cuts severing as much as 90% of the cross-sectional area of the stem had no detectable effect on the rate of transpiration or on stress in the leaves above. Double overlapping cross cuts caused irreversible increased stress and cessation of sap flow only if their vertical separation was less than a critical distance, specific for each species and related to the respective vessel lengths. Cuts separated by more than this distance had no detectable effect on stress and transpiration rate was unchanged. Also no effect was detected if a length of the stem between such cuts was cooled to near-freezing temperature, or killed by steam treatment. Patterns of heat pulse velocities showed how the sap was channelled around the cuts through remaining intact xylem.--Copyright 1973, Biological Abstracts, Inc.
W74-10790

ESTIMATING TRANSPIRATION RESISTANCE,
Kansas State Univ., Manhattan. Dept. of Agronomy.
L. J. Brun, E. T. Kanemasu, and W. L. Powers.
Agron J. Vol 65 No 2 p 326-328, 1973. Illus.
Identifiers: *Sorghum-bicolor, *Transpiration resistance, *Stomata, Diffusion porometer, Evapotranspiration, Lysimeters, Crop canopy, Methodology.

Transpiration resistance was determined in a sorghum (Sorghum bicolor (L.) Moench.) canopy by 2 methods based on the stomatal resistance of all the leaves on a plant and a third method based on the stomatal resistance of only the upper 3 leaves. Stomatal resistance was measured with the diffusion porometer. The 3 methods of determining transpiration resistance included: (1) harmonically averaging the stomatal resistance of all the leaves on a plant; (2) dividing the crop canopy into layers and weighing each layer resistance by its leaf area index; and (3) harmonically averaging the stomatal resistance of the upper 3 leaves of the plant. Methods 1 and 2 gave almost identical estimates of transpiration resistance. When methods 1 and 3 were evaluated by the Monteith evapotranspiration model, the evapotranspiration estimate using method 1 gave closer agreement with lysimeter evapotranspiration than when method 3 was used in the model.--Copyright 1973, Biological Abstracts, Inc.
W74-10806

2E. Streamflow and Runoff

THE KINEMATICS OF WATER PARTICLE OF BREAKING WAVES WITHIN THE SURF ZONE,
Naval Postgraduate School, Monterey, Calif.
E. B. Thornton, and D. P. Richardson.
Available from NTIS, Springfield, Va 22161 as AD-773 754, Price $3.25 printed copy; $2.25 microfiche. Technical Report NPS-58TM74011A, January 1974. 34 p, 12 fig, 1 tab, 12 ref.

Descriptors: *Waves(Water), *Surf, Currents(Water), Turbulence, Velocity, Statistical methods.

Simultaneous measurements of waves, and vertical and horizontal water particle velocities were made at the breaker line within the surf zone using a capacitance type penetrating wave staff, a pressure wave gage, and an electromagnetic current meter. Wave measurements were also made at seaward and shoreward locations. The wave energy-density spectral components were converted to velocity spectral components using linear wave theory. These computed values compared well qualitatively with the measured velocity spectra. Linear theory underpredicted wave-induced horizontal velocity spectral components by about 50% at the frequency of peak energy. The coherence values between waves and horizontal velocity were high, ranging above 0.75. The phase angle computation showed the calculated velocity components leading the measured velocity components by an average of 20 degrees, indicating an unstable wave crest leading the particle motion in the body of the wave. Probability density functions were computed and compared to Gaussian and Gram-Charlier distributions using the chi-square goodness-of-fit test. The Gram-Charlier distribution qualitatively gave the better fit to the data. (Knapp-USGS)
W74-10409

OREGON'S NEARSHORE OCEAN,
Oregon State Univ., Corvallis. Marine Advisory Program.
For primary bibliographic entry see Field 2L.
W74-10431

A RESERVOIR MODEL ALTERNATIVE TO THE UNIT HYDROGRAPH FOR FLOOD ESTIMATION,
Transport and Road Research Lab., Crowthorne (England).
For primary bibliographic entry see Field 4A.
W74-10432

SUMMARY OF TURBULENCE DATA FROM RIVERS, CONVEYANCE CHANNELS, AND LABORATORY FLUMES,
Geological Survey, Washington, D.C.
For primary bibliographic entry see Field 8B.
W74-10435

SAMPLING AND FLOW MEASURING DEVICE,
For primary bibliographic entry see Field 7B.
W74-10484

THE DESIGN OF SAMPLING PROGRAMMES FOR RIVERS AND EFFLUENTS,
Water Pollution Research Lab., Stevenage (England).
For primary bibliographic entry see Field 7A.
W74-10576

PROBLEMS OF THE EFFECT OF HUMAN ACTIVITY ON WATER RESOURCES AND WATER REGIME (VOPROSY VLIYANIYA KHOZYAYSTVENNOY DEYATEL'NOSTI NA VODNYYE RESURSY I VODNYY REZHIM),
Gusudarstvennyi Gidrologicheskii Institut, Leningrad (USSR).
For primary bibliographic entry see Field 4C.
W74-10626

EVALUATION OF THE EFFECT OF HUMAN ACTIVITY ON RUNOFF OF LARGE RIVERS IN THE CAUCASUS (KURA, TEREK, KUBAN') (OTSENKA VLIYANIYA KHOZYAYSTVENNOY DEYATEL'NOSTI NA STOK KRUPNYKH REK KAVKAZA (KURA, TEREK, KUBAN')),
Gosudarstvennyi Gidrologicheskii Institut, Leningrad (USSR).

For primary bibliographic entry see Field 4C.
W74-10630

FLOOD HAZARD ANALYSES, BONNER BRANCH OF THE PECATONICA RIVER, BELMONT, WISCONSIN.
Soil Conservation Service, Madison, Wis.
Flood Hazard Report, October 1973. 7 p, 9 fig.

Descriptors: *Floods, *Wisconsin, Water levels, Discharge(Water), Damages, Flood control, Hydrologic data.
Identifiers: *Belmont(Wisc).

Flood-prone areas are identified within and near the village of Belmont, Wisconsin. The floods of July 1950, and June 1969, and most other floods have been generated by summer thunderstorm precipitation. Flood damages in Belmont are slight, primarily because development has been outside of the flood plain. (Knapp-USGS)
W74-10635

HYDROLOGIC DATA FOR NORTH CREEK TRINITY RIVER BASIN TEXAS, 1972,
Geological Survey, Austin Tex.
For primary bibliographic entry see Field 7C.
W74-10640

TIME OF TRAVEL OF SOLUTES IN MISSISSIPPI RIVER FROM BATON ROUGE TO POINTE A LA HACHE, LOUISIANA,
Geological Survey, Baton Rouge, La.
For primary bibliographic entry see Field 5B.
W74-10646

AN INVESTIGATION OF THE STRUCTURE OF TURBULENCE OVER WATER SURFACE WAVES,
Michigan Univ., Ann Arbor. Dept. of Atmospheric and Oceanic Science.
D. J. Portman, and K. L. Davidson.
Available from NTIS, Springfield, Va. 22161 as AD-771 471, Price $3.00 printed copy; $2.25 microfiche. Final Contract Report for Office of Naval Research, November 1973. 19 p. ONR Contract N00014-67-A-0181-0005.

Descriptors: *Waves(Water), *Winds, *Turbulence, *Heat flow, *Air-water interfaces, Energy budget, Heat transfer, Meteorology, Abstracts, Bibliographies.

The influence of waves on the three-dimensional structure of turbulence and the vertical fluxes of momentum and sensible heat was studied by measuring wind velocity and air temperature fluctuations above waves. Analyses were made primarily in terms of variancec, covariances, spectrum and cross-spectrum functions, and joint distribution functions of the measured variables. Methods of measurement and data processing are reviewed and 14 abstracts of reports, theses, and papers resulting from the investigation are presented. (Knapp-USGS)
W74-10650

AN INTEGRATED MODEL OF STORM-GENERATED WAVES,
Virginia Univ., Charlottesville. Dept. of Environmental Sciences.
D. T. Resio, and B. P. Hayden.
Available from NTIS, Springfield, Va 22161 as AD-774 915 Price $6.50 printed copy; $2.25 microfiche. Technical Report No 8, December 1973. 270 p, 41 fig, 21 tab, 110 ref, 6 append. ONR Contract N00014-69-A-0060-0006.

Descriptors: *Waves(Water), *Storm surge, *Mathematical models, Climatology, Probability, Surf, Beach erosion, Forecasting, Storms, Frequency analysis, Statistical models, Hurricanes, Cyclones.

Sequential information on waves and storm surges generated by winter extratropical cyclones is used in a model which integrates three scales of atmospheric motions (large-scale, synoptic scale, and small scale) into an estimation of winter wave-surge climate for the mid-Atlantic coast, making possible the investigation of additional facets of wave climates such as secular and seasonal variations. A spectral model for wave generation and a bathystrophic model for wind-driven surges are used to estimate incident wave and surge heights along the east coast of the United States. Effects of shoaling and refraction are included as a function of angle of incidence and frequency for parallel bottom contours, and a significant breaker height is calculated. Waves and surges along the coast are linked to extratropical cyclones by relating the time-dependent wind-fetch field to storm size, shape, rate of movement, and direction of movement. From storm probabilities, joint probabilities of significant breaker heights and surge heights are calculated using previously derived relationships between storm characteristics and wave-surge generation. Results indicate highly significant secular and seasonal variations in large-scale circulation patterns. Associated with the large-scale changes are changes in storm frequency of 20% or more along some tracks. Additional information is available from the model to give estimates of wave sequences, wave-height durations, and accompanying surge height. (Knapp-USGS)
W74-10653

MISSOURI RIVER HYDROLOGY (STREAMFLOW AND TEMPERATURE)--SIOUX CITY, IOWA TO RULO, NEBRASKA,
Battelle-Pacific Northwest Lab., Richland, Wash.
D. L. Schreiber.
Report 1692, October 1972. 34 p, 7 fig, 4 tab, 6 ref.

Descriptors: *Missouri River, *Low flow, *Water temperature, Water resources development, Reservoir operation, River basin development, *Streamflow, *Iowa, *Nebraska.

The Missouri River is characterized by wide variations in seasonal flow; lowest flows occur during the winter months. A complicating factor during the winter is ice, which may cover the river as far south as Kansas City, Missouri. When the ice cover breaks up, significant ice jams may form and cause resultant flooding. Discharges are significantly increased in the spring due to snowmelt, and low flows generally prevail during the late summer and early fall. Missouri River stream flow characteristics are further complicated by six large storage reservoirs located on the main stem above Sioux City, Iowa. These reservoirs have a total flood storage capacity of almost 12 million acre-feet. Low-flow frequency curves are presented for four stations below the Missouri River main stem reservoir system. Once-in-ten-years, lowest average flows for seven consecutive summer days under present water resources development are as follows: Sioux City, Iowa, 23,700 cfs; Omaha, Nebraska, 25,600 cfs; Nebraska City, Nebraska, 30,900 cfs; and Rulo, Nebraska, 31,800 cfs. The once-in-ten-years, lowest average flows for seven consecutive winter days, including icing conditions, are the following for present basin development: Sioux City, Iowa, 5,000 cfs; Omaha, Nebraska, 7,000 cfs; Nebraska City, Nebraska, 8,000 cfs; and Rulo, Nebraska, 8,700 cfs. Barring major changes in present Federal laws or policy, industrial uses of the Missouri River for cooling purposes will be severely limited by the year 2020 because of depletion for other water resources development. Neither temperature changes between stations nor diurnal temperature changes at any one station appear to pose any additional constraints for industrial use of the Missouri River water in this reach for cooling purposes. (Knapp-USGS)
W74-10659

RANDOM-ACCESS TECHNIQUE FOR MODULAR BATHYMETRY DATA STORAGE IN A CONTINENTAL-SHELF WAVE-REFRACTION PROGRAM,
National Aeronautics and Space Administration, Langley Station, Langley Research Center.
For primary bibliographic entry see Field 7C.
W74-10671

SURFACE WATER SYSTEM -- 1973,
Wyoming Univ., Laramie. Water Resources Research Inst.
For primary bibliographic entry see Field 7C.
W74-10695

STREAM GAGING BY CONTINUOUS INJECTION OF TRACER ELEMENTS,
Arizona Univ., Tucson.
W. L. Werrell.
M Sc Thesis, 1967. 85 p, 11 fig, 1 tab, 11 ref, 4 append.

Descriptors: Streams, Gaging, *Tracers, Tracer elements, Dye concentrations, Laboratory tests, *Fluorescent dye, Gaging stations, Streamflow, Discharge, *Surface waters.
Identifiers: *Fluorescent dye-tracer elements, Dye-dilution, Fluorometry.

The practical application of the use of fluorescent-dye tracer elements as a means of determining stream discharge was studied. Although this approach is not new in principle, recent developments in fluorometry and the development of new and less expensive fluorescent dyes warrant reappraisal of the method. During this study, the proper use of the fluorometer was mastered, properties of the dye were examined by laboratory tests, and four field tests were conducted. Three of the field tests allowed direct comparison between discharge computed by the dye-dilution method and discharge measured by a current meter; the maximum variation between the results of these tests was 11 percent. The dye-dilution method may be used on streams in the Southwest for high-water measurements of flow above wading stage where no cableway is present or where no adequate current-meter measurement section can be found. The possibility of future automation of this measurement system holds promise for the rating of new gaging stations and for providing streamflow records in remote areas. (Staplin-NWWA)
W74-10826

2F. Groundwater

ANALOG MODEL STUDY OF THE GROUNDWATER BASIN OF THE UPPER COACHELLA VALLEY, CALIFORNIA,
Geological Survey, Washington, D.C.
For primary bibliographic entry see Field 4B.
W74-10363

DETERMINATION OF AVERAGE GRAIN SPHERICITY IN GRANULAR POROUS MEDIA,
Regional Engineering Coll., Rourkela (India). Dept. of Geology.
For primary bibliographic entry see Field 2J.
W74-10369

GEOLOGY AND HYDROLOGY OF RICE COUNTY, CENTRAL KANSAS,
Geological Survey, Lawrence, Kans.
For primary bibliographic entry see Field 4B.
W74-10408

ESSENTIALS OF GROUND-WATER HYDROLOGY PERTINENT TO WATER-RESOURCES PLANNING,
Water Resources Council, Washington, D.C. Hydrology Committee.

Bulletin No 16, August 1973. 48 p, 7 fig, 3 tab, 45 ref.

Descriptors: *U.S. Water Resources Council, *Hydrogeology, *Water management(Applied), *Mathematical models, Optimization, Design, Water yield, Groundwater movement, Planning, Management, Water resources development.

Recent advances in investigative and analytical methods of groundwater hydrology, coupled with well-established fundamental principles of groundwater behavior and a fund of descriptive knowledge of the groundwater reservoirs of the United States, provide firm footing for accelerated planning for management. Being a mobile resource, groundwater can be manipulated and managed. Modeling methods for simulation analysis constitute powerful tools for prediction of the effects of groundwater withdrawals and design of management programs. Modeling is limited by the magnitude and cost of the field effort to collect new, sufficient hydrologic and geologic data for proper description of the groundwater reservoirs and their functional characteristics. Prediction of groundwater quality behavior, though lagging behind groundwater flow methods, is progressing rapidly with marked advances in the past decade. (Knapp-USGS)
W74-10410

WATER-TABLE CONTOUR MAP, ANCHORAGE AREA, ALASKA,
Geological Survey, Anchorage, Alaska.
For primary bibliographic entry see Field 7C.
W74-10436

INFORMATION STORAGE AND RETRIEVAL SYSTEM FOR WELL HYDROGRAPH DATA USER'S MANUAL,
Battelle-Pacific Northwest Lab., Richland, Wash. Water and Land Resources Dept.
For primary bibliographic entry see Field 4B.
W74-10442

AN EVALUATION OF SUBSURFACE TECHNIQUES FOR AQUIFER PREDICTION IN COMPLEX SEDIMENTARY SYSTEMS,
Mississippi State Univ., State College. Dept. of Geology and Geography.
D. M. Keady, E. E. Russell, and T. W. Lins.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-234 426, $3.25 in paper copy, $2.25 in microfiche. Mississippi Water Resources Research Institute, Mississippi State, Completion Report, 1974. 30 p, 13 fig, 6 ref. OWRR A-074-MISS(1).

Descriptors: *Deposition(Sediments), Geology, *Groundwater, Aquifers, *Mississippi, Sands, Hydrogeology, *Clays, Subsurface investigations, *Forecasting, *Electric well logging, Sediments, Aquifer characteristics.
Identifiers: *Marine clays, *Coastal clastic-fluvial systems, *Aquifer prediction.

The feasibility of using a depositional systems approach to aquifer prediction in complex sedimentary systems was examined. Data were obtained from electrical logs of 158 oil tests and 69 water wells in 31 counties in Mississippi where the lower Wilcox is an aquifer. Three major depositional systems were recognized--a thick marine clay, a coastal clastic wedge, and a coarse coastal clastic-fluvial system. These systems include portions of the Porters Creek, Naheola, and lower Wilcox Formations. All three systems thicken downdip. Updip, the upper part of the marine clay and the coastal clastic wedge become coarser-grained and, in places, are truncated. Here, the fluvial system rests directly on the marine clays. Primary aquifers are in sands associated with the coarse coastal clastic-fluvial system, and secondary aquifers occur locally in the coastal clastic wedge. Three areas of thick sand accumulation (composite thickness greater than 200 feet) were delineated. Updip from these three areas, sands become thinner, less numerous, and aquifer prediction becomes difficult.
W74-10533

APPLICATION OF GROUNDWATER HYDRAULICS TO A BASALTIC WATER-TABLE AQUIFER,
Central Groundwater Board, Nagpur (India).
For primary bibliographic entry see Field 4B.
W74-10569

CALCULATION OF GROUNDWATER RECHARGE AND EVALUATION OF THE EFFECT OF LAND- AND FOREST-IMPROVEMENT PRACTICES (RASCHET PITANIYA GRUNTOVYKH VOD I OTSENKA VLLYANIYA NA NEGO AGROLESOMELIORATIVNYKH MEROPRIYATIY),
Gosudarstvennyii Gidrologicheskii Institut, Leningrad (USSR).
For primary bibliographic entry see Field 4C.
W74-10629

APPLICATION OF GEOPHYSICAL METHODS IN THE INVESTIGATION OF MINERAL AND THERMAL WATERS,
Institute for Geological and Geophysical Research, Belgrade (Yugoslavia).
For primary bibliographic entry see Field 4B.
W74-10645

WATER AVAILABILITY IN CENTRAL WISCONSIN - AN AREA OF NEAR-SURFACE CRYSTALLINE ROCK,
Geological Survey, Washington, D.C.
For primary bibliographic entry see Field 4B.
W74-10647

AN ESTIMATE OF LEAKAGE FROM BLACKFOOT RESERVOIR TO BEAR RIVER BASIN, SOUTHEASTERN IDAHO,
Geological Survey, Tacoma, Wash.
For primary bibliographic entry see Field 4A.
W74-10661

TEMPERATURE TRANSIENTS IN FLOWING BOREHOLES,
Oregon State Univ., Corvallis.
G. Bodvarsson, R. S.-M. Lu, and R. P. Lowell.
Geothermics, Vol 3, No 1, p 21-24, March 1974. 1 fig, 3 ref.

Descriptors: *Geothermal studies, *Boreholes, Geophysics, Porous media, Heat flow, Water yield, Flow, Mass transfer, Heat transfer, *Water temperature.
Identifiers: *Temperature transients.

Temperature transients were analyzed in a borehole in an isothermal homogeneous solid, flowing at a constant rate. When the temperature of the fluid entering the borehole at the bottom is raised by a given amount the theoretical expression for the temperature response of the borehole and a few numerical data of practical value are given. (Knapp-USGS)
W74-10677

OGALLALA AQUIFER WATER-LEVEL DATA, WITH INTERPRETATION, 1965-1974,
High Plains Underground Water Conservation District No. 1, Lubbock, Tex.
For primary bibliographic entry see Field 4B.
W74-10685

RESISTIVITY METHODS IN PROSPECTING FOR GROUND WATER,
Kansas State Univ., Manhattan. Dept. of Geology.
For primary bibliographic entry see Field 4B.
W74-10832

HYDROGEOLOGY FIELD TRIP, EAST BAY AREA AND NORTHERN SANTA CLARA VALLEY,
Stanford Univ., Calif.
S. N. Davis.
California Division of Mines and Geology, Bulletin 190, p 465-471, 1966. 6 fig.

Descriptors: Aquifer characteristics, *Hydrogeology, Groundwater resources, Land aquifers, Water table, Water yield, *California, *Field investigations, Wells.
Identifiers: *San Francisco Bay, *Hydrogeologic field studies.

A hydrogeologic field trip is described that covers an area adjacent to the southern part of San Francisco Bay. The 90 mile trip contains five stops and points to several groundwater problems in the area, such as declining groundwater levels, land subsidence, seawater intrusion, correlation of aquifers, location and design of recharge basins, and the barrier effects of active faults. Aquifer reservoirs encountered include limestone, sandstone, fractured shale, basalt serpentine, and alluvium. In terms of areal extent and total production, the alluvium reservoirs are the most prolific. The alluvial aquifers consist of lenses of gravel that yield more than 3,000 gallons per minute. In contrast, the indurated aquifers rarely yield more than five gallons per minute. Most wells near the present shoreline encounter alluvial silts, sands, and gravels, with less than 50% of the deposits having a marine or lagoonal origin. Inland wells encounter mostly alluvial deposits, with less than 10% of the deposits having a marine origin. (Martino-NWWA)
W74-10850

THE DISTRIBUTION OF MINOR ELEMENTS BETWEEN COEXISTING CALCITE AND DOLOMITE IN THE GASPORT MEMBER OF THE LOCKPORT FORMATION, LOCKPORT, NEW YORK,
New York State Univ., Buffalo.
P. J. Michalski.
MA Thesis June, 1969. 53 p, 14 fig, 5 tab, 19 ref, 1 append.

Descriptors: *Carbonates, Calcite, *Dolomite, *Magnesium, *Iron, *Manganese, Chemical reactions, Petrography, *Groundwater, *New York, Trace elements, Distribution, Path of pollutants.

Analyses of the carbonates, (calcite and dolomite), in the Gasport Member of the Lockport Formation indicate Fe and Mn are proportional to the dolomite concentration. The separate analysis of each of the coexisting carbonate phases indicates large amounts of Mg, Fe and Mn may substitute in calcite prior to or during dolomitization. Petrographic and chemical evidence indicate the incorporation of Mg, Fe and Mn in calcite may be an intermediate step in the formation of dolomite and the increased concentration of these elements in calcite, as dolomitization proceeds may represent arrested stages of dolomitization. Future studies of calcite-dolomite assembleges should include a quantitative examination of the insoluble residue to see what correlation, if any, exists between the chemical composition of the insolubles and the dolomite content. An electron micro-probe study of the calcite and dolomite in both high and low dolomite samples would be useful in determining the extent of replacement of Mg, Fe, and Mn in calcite and dolomite. (Campbell-NWWA)
W74-10861

THE OCCURRENCE OF WATER IN THE PRECAMBRIAN CRYSTALLINE ROCKS OF THE NEW JERSEY HIGHLANDS,
Rutgers. The State Univ., New Brunswick, N.J.
For primary bibliographic entry see Field 4B.
W74-10872

HOW WELLS AFFECT SHALLOW GLACIAL GROUND-WATER SUPPLIES IN SOUTH DAKOTA,
South Dakota State Univ., Brookings. Agricultural Extension Service.
For primary bibliographic entry see Field 4B.
W74-10873

HAMMAT GADER (ISRAEL): GEOCHEMISTRY OF A MIXED THERMAL SPRING COMPLEX,
Weizmann Inst. of Science, Rehovot (Israel).
E. Mazor, A. Kaufman, and I. Carmi.
Journal of Hydrology, Vol 18, No 3/4, p 289-303, March, 1973. 8 fig, 7 tab, 14 ref.

Descriptors: *Groundwater, *Salinity, *Springs, Thermal springs, Cold springs, Mineral water, Spring waters, Water types.
Identifiers: *Israel(Hammat Gader).

A complex of four spring groups has been studied. The temperature and concentrations of dissolved ions reveal the springs to be mixtures of two types of water whose characteristics were deduced by extrapolation. The hot end member is enriched in He4, Ra226 and nitrogen, flushed from the hot aquifer rocks. The Ne, Ar, Kr, and Xe have atmospheric isotopic compositions and occur in relative elemental abundances similar to those dissolved in air-saturated water. This indicates that both water end members originated from rain water that equilibrated with air and infiltrated into the ground. The Ar, Kr and Xe concentrations revealed that both water types were formed from rains that entered the ground at 'paleotemperatures' of 19 plus or minus 3C. The tritium and C14 values indicate the true hot end member to have an age older than 11,700 years whereas the true cold end member has an age of 12,000 plus or minus 1,500 years. The cold spring D is mixed with about 3% post-nuclear-tests rain water. (Skogerboe-Colorado State)
W74-10880

2G. Water In Soils

CLASSIFICATION, ENGINEERING PROPERTIES AND FIELD EXPLORATION OF SOILS, INTACT ROCK AND IN SITU ROCK MASSES,
Newmark (Nathan M.) Consulting Engineering Services, Urbana, Ill.
For primary bibliographic entry see Field 8E.
W74-10356

QUALITATIVE FEATURES OF HUMUS IN IRRIGATED CHESTNUT (GREYISH-BROWN) SOILS OF THE KARABAKH STEPPE, (IN RUSSIAN),
For primary bibliographic entry see Field 3F.
W74-10425

EFFECT OF DRAIN DEPTH AND GAP WIDTH ON POTENTIAL FLOW IN HOMOGENEOUS POROUS SOIL,
Waikato Univ., Hamilton (New Zealand). Dept. of Mathematics.
For primary bibliographic entry see Field 4A.
W74-10568

FUNCTIONING PROCESS OF DRAINAGE IN HYDROMORPHIC WASHED SOIL (SUR LE PROCESSUS DE FONCTIONNEMENT DES DRAINS EN SOL LESSIVE HYDROMORPHE),
Institut National de la Recherche Agronomique, Dijon (France). Station d'Agronomie.
For primary bibliographic entry see Field 4A.
W74-10570

SENSING OF MOISTURE CONTENT IN SOIL,
Wescor, Inc., Logan, Utah.
W. K. Barlow, E. C. Campbell, and R. G. Crockett.
U.S. Patent No. 3,803,570, 5 p, 6 fig, 5 ref; Official Gazette of the United States Patent Office, Vol 921, No 2, p 815, April 9, 1974.

Descriptors: *Patents, *Moisture content, Water management(Applied), *Soil moisture, Equipment, Measurement, Instrumentation, Irrigation.
Identifiers: *Sensors, Indicators.

The soil moisture indicating system consists of a support assembly formed with a soil anchor at the lower end of the staff of the assembly, a power supply unit mounted on the support assembly staff, a hollow mast extending upward from the power supply unit, a servomechanism mounted adjacent the upper end of the mast, a semaphore arm mounted for rotation, and a sensing probe connected by a flexible conductor to the power supply unit and, through the interior of the mast, to the servomechanism. A pair of signal flags, lights or discs are mounted at one end of the semaphore arm. A visual indication of soil moisture content is provided. A system is also disclosed for permitting the moisture sensing device to control distribution of water to the soil. (Sinha-OEIS)
W74-10592

THE FILTRATION FLOW OF PURE WATER THROUGH KAOLIN AND DARCY'S LAW (LES ECOULEMENTS DE FILTRATION DANS LE KAOLIN ET LA LOI DE DARCY),
Ecole National Superieure Agronomique de Toulouse (France).
J. Habib.
Annales Agronomiques, Vol 24, No 6, p 615-637, 1973. 13 fig, 3 tab, 27 ref. English summary.

Descriptors: *Clays, *Permeability, Darcy's Law, Hydraulic gradient, Investigations, *Kaolinite, Porosity.
Identifiers: France.

The water permeability of clays was investigated to determine if it is a constant or variable and if a hydraulic gradient threshold exists below which clay becomes impermeable. Tests on kaolin provided neither confirmation of the existence of such a threshold nor any proof of permeability independent of the hydraulic gradient, since permeability decreases rapidly with the gradient when it is low. A relationship was established between permeability, the porosity of a kaolin and the motor hydraulic gradient. (Merritt-FIRL)
W74-10607

X-RAY DIFFRACTION, ELECTRON MICROSCOPY, ELECTROPHORETIC MOBILITY, AND PH OF SOME STABLE SMECTITE-PROTEIN COMPLEXES,
New Hampshire Univ., Durham.
R. D. Harter, and G. Stotzky.
Soil Science Society of America Proceedings, Vol 37, No 1, p 116-123, January-February 1973. 9 fig, 3 tab, 17 ref. OWRR A-020-NH(9). PHS Grant A1-08767-01.

Descriptors: *Adsorption, *Clay minerals, *Proteins, *Trace elements, Soil chemistry, Sodium, Nutrients, Organic matter, Organic compounds, Hydrogen ion concentration.
Identifiers: *Clay-organic complexes.

Stable clay-protein complexes were studied using X-ray diffractometry, electron microscopy, electrophoretic mobility, and pH measurements. Pepsin was adsorbed to positive edge sites on the smectite, and all other proteins were adsorbed on planar surfaces. Casein, chymotrypsin, lysozyme, and ovomucoid intercalated the H and Na-smectites, and catalase may have intercalated the H-smectite. All proteins, except catalase, intercalated the clays when the weight ratio of protein-to-clay exceeded about 1:5. Catalase did not appear to intercalate the Ca, Al, La, or Th-smectites, even though the ratio of adsorbed protein-to-clay exceeded 1:5. The electrophoretic mobility of the H, Na and Th-smectites became less negative upon adsorption of proteins, indicating a physical or chemical covering of the negative clay surface charge and a flocculation of the complex. When protein was adsorbed by Ca, Al, and La-smectites, they either showed little change or increased in electrophoretic mobility, indicating a tendency for clay tactoids to be broken. The pH of all protein-clay complexes tended to approach neutrality. In the acid clays (H, Al, and Th-emectite), especially, this indicated a cation exchange reaction, since the exchanged inorganic ions would be subsequently removed from the clay. (Knapp-USGS)
W74-10641

DETERMINATION OF CLAY SURFACE ACIDITY BY INFRARED SPECTROSCOPY,
Purdue Univ., Lafayette, Ind. Dept. of Agronomy.
R. D. Harter, and J. L. Ahlrichs.
Soil Science Society of America Proceedings, Vol 31, p 30-33, January-February 1967. 5 fig, 5 ref. OWRR A-020-NH(4).

Descriptors: *Clay minerals, *Hydrogen ion concentration, *Weathering, *Water chemistry, Organic compounds, Spectroscopy, Infrared radiation, Analytical techniques.

A new and simple method for estimating pH at the surface of colloidal particles uses infrared spectroscopy to determine the effect that proximity to a colloidal surface has on an organic acid molecule. An intensity ratio of the carboxylate to carbonyl infrared absorption bands of organic acids can be used as an indicator of hydrogen ion activity in the compound's environment. Benzoic acid seems to be the best choice for this type of study, since it is not adsorbed by the clay surface in the presence of water. The surface of Wyoming bentonite is about 100 times more acid than the solution at a pH of about 7.0. As the pH decreases, there is a decreasing difference between surface and solution pH. (Knapp-USGS)
W74-10643

EQUIPMENT FOR MEASURING THE WATER PERMEABILITY AS A FUNCTION OF DEGREE OF SATURATION FOR FROST SUSCEPTIBLE SOILS,
Massachusetts Inst. of Tech., Cambridge.
A. E. Z. Wissa, R. T. Martin, and D. Koutsoftas.
Available from NTIS, Springfield, Va 22161 as PB-222 803 Price $7.25 printed copy; $2.25 microfiche. Final Contract Report to Pennsylvania Department of Transportation, December 1972. 100 p, 34 fig, 4 tab, 6 ref.

Descriptors: *Permeameters, *Permeability, *Hydraulic conductivity, *Freezing, Frost, Instrumentation, Frozen soils, Unsaturated flow, Saturated flow.

Water permeability may be measured as a function of degree of saturation on laboratory compacted soil samples. The apparatus can be operated at hydrostatic pressure up to 7 kg per sq cm. The water flow system was designed for continuous uninterrupted flow at high pressure and for manual monitoring of inflow and outflow rates. The turnaround time for a test using only one cell is 3 days. The permeability was reproducible to better than a factor of two which was deemed adequate because the permeability changed several orders of magnitude during any one test. The frost susceptibility of the soils tested was predicted and compared with predictions obtained from CRREL and MASS freezing test procedures. (Knapp-USGS)
W74-10657

TEST OF A NEW MODEL FOR THE KINETICS OF ADSORPTION-DESORPTION PROCESSES,
Utah State Univ., Logan. Dept. of Soils and Biometeorology.
For primary bibliographic entry see Field 5G.
W74-10742

SPRINKLIGATION SPECIAL.
For primary bibliographic entry see Field 3F.
W74-10746

A QUICK-WEIGHING LYSIMETER SYSTEM CHECK,
Agricultural Research Service, Prosser, Wash. Irrigated Agriculture Research and Extension Center.
For primary bibliographic entry see Field 7B.
W74-10749

CALCULATION OF EVAPORATION FROM MEASUREMENTS OF SOIL WATER AND THE SOIL WATER CHARACTERISTIC,
Guelph Univ. (Ontario). School of Engineering.
For primary bibliographic entry see Field 2D.
W74-10758

EFFECT OF SOIL MOISTURE DURING EARLY STAGES OF DEVELOPMENT ON GROWTH AND YIELD OF COTTON PLANTS,
Hebrew Univ., Rehovot (Israel). Faculty of Agriculture.
For primary bibliographic entry see Field 3F.
W74-10761

A COMPARISON OF PHYSICALLY-BASED INFILTRATION EQUATIONS,
Agricultural Research Council, Cambridge (England). Unit of Soil Physics.
D. Swartzendruber, and E. G. Youngs.
Soil Science, Vol 117, No 3, p 165-167, March, 1974. 1 fig, 10 ref.

Descriptors: *Model studies, *Infiltration, Mathematical studies, *Equations.
Identifiers: *Infiltration equations, Green equation, Ampt equation, *Philip equation.

Three infiltration equations derived from a consideration of the physics of flow through porous media are compared quantitatively over time from zero to infinity. Compared with the Green and Ampt equation, the two-term Philip equation is never more than 15.1 percent higher, while the equation arising out of Philip's linearization analysis is never less than 9.2 percent lower. For practical use these discrepancies may be ignored. Because of its mathematical simplicity and adaptability, the two-term Philip equation, however, would be the preferred choice. (Murphy-FIRL)
W74-10823

SANITARY LANDFILL LEACHATE INTERACTIONS WITH A CARBONATE-ROCK DERIVED SOIL IN CENTRAL PENNSYLVANIA,
Pennsylvania State Univ., University Park. Dept. of Geology and Geophysics.
For primary bibliographic entry see Field 5B.
W74-10827

THE EFFECTS OF WATER CONTENT AND DENSITY ON THE ELECTRICAL RESISTIVITY OF SOIL,
Brooklyn Coll., N.Y. Dept. of Geology.
W. D. Jones.
M A Thesis, May 1970. 64 p, 22 fig, 2 tab, 11 ref.

Descriptors: Water chemistry, Soil water, *Resistivity, Pore water, Temperature, Ionization, Soil types, Electrical conductance, *Density.
Identifiers: *Soil water content, *Soil water density, Soil resistance, Partially saturated soil.

Resistivity in a partially saturated soil is a function of temperature, nature of solution, density, water content, and soil type. If the resistivity of water is made constant, the resistivity of a given partially saturated soil will be a function of (1) the cross-sectional area of its pore water and (2) the effective path length between electrodes. These are, in turn, functions of soil water content and density. An increase in salt concentration in the soil will result in a decrease in resistance in the soil. Because resistivity of the solution is a function of ionization, an increase in temperature will also result in increased electrical conductivity. Using original experimental data, an attempt is made to apply the principle as a non-destructive water-content measurement. Because soil resistance is found to be a hyperbolic function of water content, the method loses effectiveness at higher water contents. (Campbell-NWWA)
W74-10829

LAND DRAINAGE OF REDDISH CLAY LOAMS,
Wisconsin Univ., Madison.
For primary bibliographic entry see Field 3F.
W74-10879

COMPARISON OF DRAINAGE METHODS IN A HEAVY-TEXTURED SOIL,
Ohio Agricultural Research and Development Center, Wooster.
For primary bibliographic entry see Field 3F.
W74-10881

THE AGRICULTURAL USE OF BLACKBURN SEWAGE SLUDGE,
Blackburn County Board Corp. (England).
For primary bibliographic entry see Field 5D.
W74-10895

2H. Lakes

NEW DATA ON CARBONATE FORMATION IN LAKE BALKHASH (NOVYYE DANNYYE O KARBONATOOBRAZOVANII V OZ. BALKHASH),
Akademiya Nauk SSSR, Moscow. Geologicheskii Institut.
For primary bibliographic entry see Field 2J.
W74-10384

LIMNOLOGY OF LAKE MINNETONKA,
Minnesota Univ., Minneapolis. Limnological Research Center.
For primary bibliographic entry see Field 5C.
W74-10418

MECHANISMS THAT REGULATE GROWTH RATES OF PHYTOPLANKTON IN SHAGAWA LAKE, MINNESOTA,
Minnesota Univ., Minneapolis. Limnological Research Center.
For primary bibliographic entry see Field 5C.
W74-10422

THE EFFECTS OF VARIATIONS IN TURBIDITY ON CYCLES OF PLANKTONIC AND BENTHIC ORGANISMS IN FLOOD CONTROL RESERVOIRS OF NORTHERN MISSISSIPPI,
Mississippi Univ., University. Dept. of Biology.
For primary bibliographic entry see Field 5C.
W74-10532

A MATHEMATICAL MODEL OF A RIVER PURIFICATION LAKE,
Severn River Authority (England).
For primary bibliographic entry see Field 5C.
W74-10571

PRELIMINARY ESTIMATE OF THE EFFECTS OF IRRIGATED AGRICULTURE ON STREAMFLOW IN THE LAKE BALKHASH BASIN (PREDVARITEL'NAYA OTSENKA VLIYANIYA OROSHAYEMOGO ZEMLEDELIYA NA RECHNOY STOK V BASSEYNE OZ. BALKHASH),
Gosudarstvennyi Gidrologicheskii Institut, Leningrad (USSR).
For primary bibliographic entry see Field 4C.
W74-10633

ADSORPTION OF PHOSPHORUS BY LAKE SEDIMENT,
New Hampshire Univ., Durham.
For primary bibliographic entry see Field 5C.
W74-10642

ONE-DIMENSIONAL ANALYSIS OF HEAT DISSIPATION IN A SIDEARM OF A COOLING LAKE,
Oak Ridge National Lab., Oak Ridge, Tenn.
For primary bibliographic entry see Field 5B.
W74-10651

HYDROLOGY OF LAKE TARPON NEAR TARPON SPRINGS, FLORIDA,
Geological Survey, Tallahassee, Fla.
J. D. Hunn.
Florida Bureau of Geology Map Series No 60, 1974. 1 sheet, 7 fig, 1 map, 18 ref.

Descriptors: *Surface-groundwater relationships, *Karst hydrology, *Florida, *Lakes, Limnology, Salinity, Tides, Water level fluctuations, Aquifers, Sea water, Tracers.
Identifiers: *Lake Tarpon(Fla).

Lake Tarpon, in northern Pinellas County, Florida, is used principally for boating, fishing, and swimming. The lake was used for water supply only during a 4-year period between March 1926 and May 1930. It has not been used for this purpose since because of the frequent inflow of saline water through a sinkhole on the west side of the lake. To prevent this inflow, an earthen ring dike with four gated culverts was constructed around the sinkhole in May 1969. An outlet canal leading south to Tampa Bay was completed in July 1967. Since the enclosure of the sink, the lake water has become less saline. Before the outlet canal was opened, the only known outlet was Lake Tarpon Sink. The lake water would drain, at irregular intervals, into the sink through the Floridan Aquifer to Tarpon Spring in Spring Bayou, a small tidal estuary about 3 miles northwest of Lake Tarpon Sink in the city of Tarpon Springs. At other times salt water from Spring Bayou would move back through the aquifer, up through the sink, and into Lake Tarpon. The chloride content of water in the lake has ranged from near zero to nearly 5,000 milligrams per liter. The pattern of the water-level fluctuations in Lake Tarpon Sink is similar to the pattern of tidal fluctuations in Spring Bayou in Tarpon Springs. The bottom sediments, which were saturated with water having a high chloride content before the sink was enclosed, are probably the principal source of chloride contamination of the lake water at the present time and probably will continue to contaminate the lake for several years. (Knapp-USGS)
W74-10673

THE WATERS OF MEROM: A STUDY OF LAKE HULEH. III. THE MAJOR CHEMICAL CONSTITUENTS OF A 54 M. CORE,
Yale Univ., New Haven, Conn. Osborn Memorial Labs.
G. E. Hutchinson, and U. M. Cowgill.
Archiv fur Hydrobiologie, Vol 72, No 2, p 145-185, 1973. 15 fig, 5 tab, 14 ref.

Descriptors: *Stratigraphy, *Chemical stratification, *Cores, Chemical properties, History, Titani-

um, Aluminum, Potassium, Phosphorus, Iron, Manganese, Magnesium, Calcium, Strontium, Fluorine, Chlorine, Bromine, Nitrogen, Carbon, Sulfur, Paleolimnology, Hydrogen.
Identifiers: *Israel(Lake Huleh), Silicon, Rubidium, Barium.

The core taken in Lake Huleh showed a sedimentary record of the lower zone in shallow water and an upper zone of lacustrine sediment, implying volcanic damming of the Jordan Valley around 22,000 B.P. Elements studies were: positively correlated with titanium (Al, Si, Ti, K, Rb, Fe, Mn, Mg and Ba), negatively correlated with titanium (Ca, Sr, F), and not significantly correlated with titanium (Cl, Br, combined N, organic C (valid only in lower zone), organic H and S). Chemistry of the lower swamp zone and other shallow water sediments is primarily determined by the amount of organic matter. During the first 10,000 years after formation of the deep lake, sediment, low in organic matter, changed from argillaceous to calcareous. Around 9700 B.P. argilaceous material again became abundant; both types increased to a maximum rate of sedimentation probably about 9000 B.P.; thereafter rate of argillaceous deposition declined far more than the calcareous deposition. Periods of high or low calcareous sedimentation must be due to differences in material eroded into the lake rather than to differences in rate of calcite photosynthetic precipitation. No evidence of any purely internal maturation from oligotrophy to eutrophy is recorded. (Jones-Wisconsin)
W74-10763

RELATIONSHIPS BETWEEN SOIL SALINITY AND THE SALINITY OF APPLIED WATER IN THE SUISUN MARSH OF CALIFORNIA,
California State Dept. of Fish and Game, Sacramento.
For primary bibliographic entry see Field 4A.
W74-10764

OUR GREAT LAKES,
Wisconsin Univ., Madison. Sea Grant College Program.
For primary bibliographic entry see Field 5C.
W74-10784

DIEL OVERTURNING IN LAKES,
CH2M/Hill Redding, Calif.
For primary bibliographic entry see Field 5B.
W74-10797

SOME CHARACTERISTIC FEATURES OF THE BACTERIAL DECOMPOSITION IN SEDIMENTS FROM LAKES AND PONDS IN SOUTHWEST GREENLAND (THE NARSSAQ AREA),
Copenhagen Univ. (Denmark). Inst. of Hygiene.
For primary bibliographic entry see Field 5C.
W74-10799

ADDITIONS TO THE WEST VIRGINIA ICHTHYOFAUNA, WITH COMMENTS ON THE DISTRIBUTION OF OTHER SPECIES,
Virginia Polytechnic Inst. and State Univ., Blacksburg. Dept. of Biology.
P. S. Hambrick, C. H. Hocutt, M. T. Masnik, and J. H. Wilson.
Proceedings of the West Virginia Academy of Sciences, Vol 45, No 1, p 58-60, 1973. 7 ref.

Descriptors: *Fish, *West Virginia, *Distribution, Systematics.
Identifiers: East River(W Va), *Notropis galacturus, *Notropis telescopus, Nocomis 1. leptocephalus, *New River(W Va).

An ichthyological investigation of portions of the New (upper Kanawha) River drainage above Bluestone Reservoir, West Virginia was conducted. Included among the collection sites were two localities on the East River sampled by seine. Two minnows, Notropis galacturus and N. telescopus were added to the state's known fish fauna. Distributional records were established for six other species. Some counts and measurements of 20 specimens are given. Species collected at both stations and at station 2 only are listed. The previous record of N. cornutus chrysocephalus from the drainage is from the Greenbrier River where it was believed to have been introduced. N. hudsonius, considered to be introduced into the drainage has spread rapidly throughout the New River and is now established in the lower portions of East River in West Virginia. Capture of Percina crassa roanoka in East River established the second distributional record for this species within the state; one specimen from the Greenbrier River is the only other known collection record in West Virginia. It is recommended that Nocomis 1. leptocephalus, Notropis galacturus, N. telescopus, and Percina crassa roanoka be placed on the West Virginia list of rare and endangered fishes. (Jones-Wisconsin)
W74-10800

EFFECT OF WATER LEVEL FLUCTUATION ON LAKE VEGETATION,
Uppsala Univ. (Sweden).
For primary bibliographic entry see Field 5C.
W74-10801

DIURNAL PRIMARY PRODUCTION PATTERNS IN SEVEN LAKES AND PONDS IN ALBERTA (CANADA),
Calgary Univ. (Alberta). Dept. of Biology.
For primary bibliographic entry see Field 5C.
W74-10802

VERTICAL ENTRAINMENT INTO THE EPILIMNIA OF STRATIFIED LAKES,
Canada Centre for Inland Waters, Burlington (Ontario).
For primary bibliographic entry see Field 5C.
W74-10803

COMPUTER MODELING OF SEDIMENT AND PHOSPHORUS MOVEMENT INTO CANADARAGO LAKE,
Cornell Univ., Ithaca, N.Y. Dept. of Agronomy.
For primary bibliographic entry see Field 5B.
W74-10807

OBSERVATIONS ON THE LIMNOLOGY AND PRIMARY PRODUCTION OF A SMALL MAN-MADE LAKE IN THE WEST AFRICAN SAVANNA,
Sussex Univ., Brighton (England). School of Biological Sciences.
For primary bibliographic entry see Field 5C.
W74-10810

DERIVATION OF DAILY PHYTOPLANKTON PRODUCTION ESTIMATES FROM SHORT-TERM EXPERIMENTS IN SOME SHALLOW, EUTROPHIC AUSTRALIAN SALINE LAKES,
Monash Univ., Clayton (Australia). Dept. of Zoology.
For primary bibliographic entry see Field 5C.
W74-10812

2I. Water In Plants

ECOLOGICAL OUTLINE OF THE ARBORETUM AT PETILS AND ADJACENT UNDERGROWTH IN THE VILLE-CARTIER (ILLEET-VILAINE) FOREST,
F. Leduc.
Bot Rhedonica Ser A. 12 p, 129-144, 1972, Illus.
Identifiers: Abies, *Arboretum, Chamaecyparis, Climates, Cupressus, *Ecological studies, *Forests, Juniperus, Larix, Petils, Picea, Pinus, Soil, Thuja, Undergrowth, *France(Ville-Cartier forest).

Ecological conditions were compared in 2 neighboring (100 m) stations in areas of: undergrowth in the Ville-Cartier forest (France); and open prairie on the northern edge of the forest at an altitude of approximately 105 m. The forest is on a plateau not exceeding 110 m. The following conditions were compared: soil composition, permeability, water retention capacity, climatic factors such as rainfall, evaporation, temperature, vegetation. A slight variation in clay content caused temporary water accumulation at the edge of the forest. The presence of abundant dew in the summer at the edge of the forest creates a favorable environment for trees requiring a humid atmosphere. A cold microclimate exists at the soil level, characterized by large temperature ranges. This can be unfavorable to development during the early years. Planting of trees in the arboretum is guided by requirement for soil moisture and climate (temperature and sunlight). Thus, Abies was planted nearest the edge of the forest, in the most humid part, shaded by Picea and Larix. Plants requiring progressively less water and progressively more sunlight are planted farther from the forest: Chamaecyparis, Cupressus, Juniperus, Thuyja, Pinus. These studies demonstrate the ecological modifications involved in the transition from arboretum to forest.--Copyright 1973, Biological Abstracts, Inc.
W74-10421

ON THE THERMOELECTRIC MEASUREMENT OF WATER TRANSFER IN PLANT STEMS,
R. Michler.
Ber Dtsch Bot Ges., Vol 85, No 5/6, p 203-208, 1972. Illus.
Identifiers: *Coffea-Arabica, *Eucalyptus, *Measurement(Thermoelectric), *Orange plants, Stems, *Water transfer(Plants), Water-plant relationships.

The shortcomings of the 'heat impulse' and 'continuous' methods are pointed out, but a combination of the two can yield favorable results. Over compensation and autonomous deviation problems encountered in experiments on Eucalyptus, Coffea arabica and orange plants are discussed. Autonomous deviations vary according to the organism studied and the climate. Blowers are used to circulate the air in the test area and keep a constant temperature.--Copyright 1973, Biological Abstracts, Inc.
W74-10601

WATER REGIMEN AND NITROGEN AND PHOSPHORUS METABOLISM IN PLANTS AFFECTED BY CHLOROCHOLINECHLORIDE (CCC), (IN RUSSIAN),
Akademiya Nauk SSR, Moscow. Inst. of Plant Physiology.
For primary bibliographic entry see Field 3F.
W74-10604

PERIODICITY OF WOOD FORMATION IN SOME TREES OF LOWLAND RAINFOREST IN NIGERIA,
Nigeria Univ., Nsukka. Dept. of Botany.
C. C. Amobi.
Ann Bot (Lond). Vol 37, No 149, p 211-218. 1973. Illus.
Identifiers: Bombax-Buonopozense, Forests, Growth, *Nigeria(Ibadan), *Periodicity(Wood formation), *Rainforests, Seasonal, Trees.

Freshly prepared chlor-zinc-iodide was used to determine the periodicity of wood formation at breast height (144 cm from the ground) in the trunks of some trees growing in the Lowland Rainforest around Ibadan, Nigeria. Wood formation shows seasonal periodicity in the plants studied. The cambial derivatives on the xylem side dif-

ferentiate into wood cells, which at a certain stage of differentiation have abundant cellulose in their secondary walls. The cellulose stains deep blue in chlor-zinc-iodide. This has been used as a criterion for deciding that wood formation has started. When no cells with deep blue staining secondary walls are found the cambium is known to be dormant or quiescent. The resumption of cambial activity is correlated positively with bud break and unfolding of new leaves. In Bombax buonopozense P. Beauv. the relationship may be obscured by local cambial activity induced by injury. Wood formation stops in the trunks either towards the end of the rainy season or at the early part of the dry season. It starts either during the dry season or at the beginning of the rainy season; but the bulk of the wood is formed during the rainy season. Cambial activity stops in most cases before leaf fall. Presence or absence of a starch-free zone and the noding of the vascular rays also give indication of seasonal periodicity in wood formation. Growth rings are periodic and one growth ring is generally formed each year.--Copyright 1973, Biological Abstracts, Inc.
W74-10730

ON THE MECHANISM OF WATER-STRESS-INDUCED STEM DEFORMATION,
Auburn Univ., Ala.
For primary bibliographic entry see Field 3F.
W74-10796

TEMPERATURE AND MOISTURE EFFECTS ON HARDENING OF APPLE ROOTS,
North Central Forest Experiment Station, Grand Rapids, Minn.
For primary bibliographic entry see Field 3F.
W74-10882

2J. Erosion and Sedimentation

EFFECT OF A LOW IMPERMEABLE GROIN ON SHOREZONE GEOMETRY AND TEXTURE, POINT MUGU, CALIFORNIA,
California Univ., Los Angeles. Dept. of Geography.
For primary bibliographic entry see Field 8B.
W74-10358

A FIELD INVESTIGATION OF THE HYDRAULICS AND STABILITY OF CORPUS CHRISTI WATER EXCHANGE PASS, TEXAS,
Texas A and M Univ., College Station. Dept. of Civil Engineering.
For primary bibliographic entry see Field 2L.
W74-10361

CURRENT-CONTROLLED ABYSSAL SEDIMENTATION: SAMOAN PASSAGE, EQUATORIAL WEST PACIFIC,
Woods Hole Oceanographic Institution, Mass.
C. D. Hollister, D. A. Johnson, and P. F. Lonsdale.
Journal of Geology, Vol 82, No 3, p 275-300, May 1974. 19 fig, 1 tab, 40 ref.

Descriptors: *Bottom sediments, *Sedimentation, *Pacific Ocean, Sounding, Seismic studies, Sediment transport, Erosion, Deposition(Sediments), Topography, Sampling, Sedimentary structures.
Identifiers: *Samoan Passage(West equatorial Pacific).

Sedimentation in the Samoan Passage of the west equatorial Pacific was studied in 1971, utilizing seismic reflection profiles, bottom photographs, bottom current measurements, bottom water temperature profiles, and sediment cores. Rugged topography with pelagic draping of sediment and infrequent slumping are found on passage walls. Smooth topography and manganese nodules on semi-indurated sediment are related to continued fast (20-50 cm/sec) bottom current flow causing erosion or non-deposition near the passage axis. Compact unfossiliferous zeolitic and ash-rich clay, containing some manganese nodules are related to slow deposition of compact sediment from bottom currents (5-10 cm/sec). Watery abyssal brown clays interbedded with reworked and cross bedded biogenic ooze are related to rapid accumulation of sediment from waning sediment-laden bottom currents in the area north of the passage. The sedimentary record in and around the Passage indicates that relatively intense current flow through the Passage was initiated at some time between the early Eocene and early Oligocene, and continued through most of the Tertiary. Lithologic data suggest significant periodic fluctuations in erosive effects of bottom currents during the Quaternary. (Knapp-USGS)
W74-10364

A RAPID AND ACCURATE METHOD FOR THE ANALYSIS OF CALCIUM CARBONATE IN SMALL SAMPLES,
Amherst Coll., Mass. Dept. of Geology.
B. F. Molnia.
Journal of Sedimentary Petrology, Vol 44, No 2, p 589-590, June 1974. 1 fig, 2 ref.

Descriptors: *Calcium carbonate, *Sedimentology, *Chemical analysis, Filters, Filtration, Laboratory tests.

A method which permits rapid and accurate analysis of calcium carbonate by weight loss-acid digestion is presented. The method permits analysis where only small weight samples are available, such as deep sea cores, but can also be used with larger samples. The technique makes use of a commercially available bacterial filter apparatus and plastic or nitrocellulose filter discs. The error is less than 1%. The number of samples that can be completed in one hour is 15-20. The method works best for very small samples--less than one gram--especially when carbonate content is low. (Knapp-USGS)
W74-10366

A SETTLING TUBE SYSTEM FOR SAND-SIZE ANALYSIS,
Northwestern Univ., Evanston. Dept. of Geological Sciences.
R. J. Gibbs.
Journal of Sedimentary Petrology, Vol 44, No 2, p 583-588, June 1974. 4 fig, 4 ref.

Descriptors: *Settling velocity, *Sedimentology, *Instrumentation, *Particle size, Measurement, Equipment, Data collections, Data processing.
Identifiers: *Settling tubes.

An accurate and precise settling tube is described. Its diameter is 12 cm and the settling distance is 140 cm or more. It has three options for data handling: (1) recording data on a strip chart recorder; (2) recording data on punched paper tape; and (3) utilizing a dedicated minicomputer to handle the data. The pan upon which the sediment accumulates hangs at the bottom of the tube suspended by a wire attached to an electronic balance. The signal output from the electrobalance is a cumulative curve of the weight accumulating as a function of time. (Knapp-USGS)
W74-10367

MEASURES OF PARTICLE ROUNDNESS: A NOTE,
University of New England, Armidale (Australia). Dept. of Geography.
B. Swan.
Journal of Sedimentary Petrology, Vol 44, No 2, p 572-577, June 1974. 3 fig, 3 tab, 23 ref.

Descriptors: *Particle shape, *Sedimentology, Sediments, Sedimentation, *Measurement, Porous media.
Identifiers: *Roundness(Particle shape).

Measures of roundness for individual detrital particles need to be readily applicable and reasonably representative of what they purport to depict. A review of better known methods shows that the use of intercept measurements such as length and width introduce a flatness-sphericity factor into the computation. Curvature measures involving consideration of only the curvature of the sharpest corner understates roundness values. Wadell's method of relating the mean curvature of n corners to the maximum inscribed circle is the most representative. However, the complexity of Wadell's technique may be reduced without serious disadvantage by considering curvature only in regard to the two sharpest corners. It is also postulated that curvature measurements are most usefully made only along a single (the principal) plane. (Knapp-USGS)
W74-10368

DETERMINATION OF AVERAGE GRAIN SPHERICITY IN GRANULAR POROUS MEDIA,
Regional Engineering Coll., Rourkela (India). Dept. of Geology.
B. K. Sahu.
Journal of Sedimentary Petrology, Vol 44, No 2, p 578-582, June 1974. 16 ref.

Descriptors: *Particle shape, *Sedimentology, Sediments, Sedimentation, Measurement, *Porous media.

Average grain sphericity in porous media is a function of fractional porosity and specific surface of the natural porous media as well as of specific spherical surface per unit solid volume if the natural irregular grains are replaced by fictitious spheres of equal volume as those of natural grains. These three variables can be easily measured by thin section or by loose grain methods, but the thin section method is preferred because of its greater accuracy in the whole range of size of interest, its ease and quickness, and its applicability to consolidated as well as unconsolidated granular media. (Knapp-USGS)
W74-10369

THE OCCURRENCE OF GLAUCONITE IN MONTEREY BAY, CALIFORNIA, DIVERSITY, ORIGINS, AND SEDIMENTARY ENVIRONMENTAL SIGNIFICANCE,
California Univ., Santa Cruz. Earth Science Board.
For primary bibliographic entry see Field 2L.
W74-10370

COASTAL PROCESSES AND DEPOSITIONAL PATTERNS ON CAPE ANN, MASSACHUSETTS,
Williams Coll., Williamstown, Mass.
R. W. Cunningham, and W. T. Fox.
Journal of Sedimentary Petrology, Vol 44, No 2, p 522-531, June 1974. 5 fig, 11 ref.

Descriptors: *Sedimentation, *Beaches, *Sediment transport, *Massachusetts, Provenance, Geomorphology, Littoral drift, Waves(Water), Ocean waves, Surf, Refraction(Water waves), Storms.
Identifiers: *Cape Ann(MA).

Four beaches on the southeastern coast of Cape Ann, Massachusetts, were studied to determine sediment source, transport, and depositional patterns. Methods of analysis included beach profiling, sediment sampling, and simulated wave refraction. Wave energy, resulting primarily from northeast storms and the prevailing southwesterlies, concentrates on nearshore island and headland complexes. Due to wave refraction, northeast flowing longshore currents are found at Long, Cape Hedge and Pebbly Beaches. At Good Harbor, longshore drift is predominantly southwestward. The wave energy and refraction patterns determine beach gradients and grain size

distribution. Predominate direction of longshore drift and systematic internal decreases in grain sizes show spits to be the origins of the baymouth barrier beaches. Sand-size sediments are primarily glacial in origin and secondarily a result of erosion of the crystalline headlands. The source of cobbles at Cape Hedge and Pebbly Beaches is a moraine which intersects the shoreline at Cape Hedge. (Knapp-USGS)
W74-10371

DYNAMIC RELATIONSHIP BETWEEN HYDRAULICS AND SEDIMENTATION IN THE ALTAMAHA ESTUARY,
Tulsa Univ., Okla. Dept. of Geology.
For primary bibliographic entry see Field 2L.
W74-10372

EARLY DIAGENESIS: EXPANSIBLE SOIL CLAY-SEA WATER REACTIONS,
State Univ., of New York, Binghamton. Dept. of Geological Sciences.
H. E. Roberson.
Journal of Sedimentary Petrology, Vol 44, No 2, p 441-449, June 1974. 4 fig, 2 tab, 29 ref. NSF Grant GA-22846.

Descriptors: *Expansive clays, *Sea water, *Ion exchange, *Diagenesis, Water chemistry, Sorption, X-ray diffraction, Illite, Montmorillonite, Clay minerals, Mineralogy.

Reactions between two clay-sized vermiculites, one montmorillonite, and one Al-hydroxy-vermiculite, saturated with Ca, were studied for periods up to 10 months. The absorbed cation composition of the clays changes very little after only a few days of contact with sea water. A large proportion (up to 40%) of the interlayer cations become nonexchangeable after prolonged contact with sea water. After contact with sea water for 11 weeks, the ratio of adsorbed Mg to adsorbed K varies from about 1:1 to 5:1 for these four samples, and the amount of adsorbed Na is less than 20% of the total adsorbed cation content for all these samples. X-ray diffraction patterns of sea water immersed samples show that discrete illite does not form as had been expected. Instead, a mixed-layer phase develops. This phase is a random interstratification of illite-like and expansible layers. The 001 diffraction maximum produced by this mixed-layer phase is extremely broad. Burial diagenesis would tend to transform thismixed-layer clay into illite and chlorite. Expansible soil clays delivered to the oceans as part of the suspended load of rivers can adsorb up to 50% or more of all the K and Mg delivered as dissolved load to the oceans. (Knapp-USGS)
W74-10373

STRUDEL SCOUR: A UNIQUE ARCTIC MARINE GEOLOGIC PHENOMENON,
Geological Survey, Menlo Park, Calif.
E. Reimnitz, C. A. Rodeick, and S. C. Wolf.
Journal of Sedimentary Petrology, Vol 44, No 2, p 409-420, June 1974. 11 fig, 8 ref.

Descriptors: *Scour, *Bottom sediments, *Sea ice, *Ice breakup, *Arctic, Erosion, Sedimentation, Sedimentary structures, Sedimentology, Tundra.
Identifiers: *Strudel scour.

When northward-flowing rivers of Alaska inundate extensive areas of sea ice during spring breakup, drainage of freshwater through the ice at holes and cracks (strudel) causes scour depressions more then 4 m deep and as much as 20 m or more across in the sea floor below. These strudel scours and their filled counterparts were studied by side-scan sonar, echosounder, high-resolution seismic gear, diving observations, and sediment sampling. Strudel scours occur within 30 km of river mouths. The scours are most numerous in the inner areas of overflow, as many as 25/km. One strudel scour investigated by diving was surrounded by a ridge, had vertical walls exposing a tundra horizon, and terminated at a gravel layer 4 m below a lagoon floor. Another one terminated at a semiconsolidated layer of silty clay. Both the gravel and silty clay are pre-Holocene deposits. From highly irregular bedding in seismic records it is apparent that virtually all of the Holocene deposits and significant parts of underlying older sediments around river mouths have been reworked by strudel scour. This mixing of sediments by vertical strudel flow causes sediment types to vary greatly over small areas. These new observations add further complicating factors to be considered in the interpretation of shallow-water deposits of cold climates. (Knapp-USGS)
W74-10374

SEDIMENTATION ON GRAVEL OUTWASH FANS, MALASPINA GLACIER FORELAND, ALASKA,
Massachusetts Univ., Amherst. Dept. of Geology and Geography.
T. Gustavson.
Journal of Sedimentary Petrology, Vol 44, No 2, p 374-389, June 1974. 20 fig, 2 tab, 19 ref. ONR-GP Contract N00014-67-A-0230-0001

Descriptors: *Sedimentation, *Glacial drift, *Alluvium, Gravels, Glaciers, *Alaska, Sediment transport, Deposition(Sediments), Sedimentary structures, Stratigraphy, Braiding, Sand bars.
Identifiers: *Malaspina Glacier(AK), Outwash.

Three depositional facies occur on the outwash fans of Fountain Stream and Alder Stream, which drain portions of the Malaspina Glacier along the northeastern Gulf of Alaska. Longitudinal bars are deposited during high-flow stage; they consist of plane-bedded, imbricate, very poorly sorted pebble and cobble gravels. The sediment of the bars decreases in mean size downstream. Some bars terminate in avalanche slip faces of poorly sorted, silty, medium to coarse sand. Paleocurrent directions suggest that stream flow diverges across bar surfaces. Deposition in channels occurs in two morphologically distinct areas, riffles and pools. Sediment deposited in pools consists primarily of ripple cross-laminated, poorly sorted, silty, medium to coarse sand, commonly capped by draped lamination. Ripple crests vary from straight to cuspate. Sediment in riffles consists of gravel laid down under upper flow regime conditions as transverse ribs and stone cells. Both apparently are relict antidune bedforms. During late-stage flow, thin patches of horizontally bedded san are deposited between transverse ribs and adjacent stone-cell borders. The longitudinal bar facies and channel pool facies are common in cutbank sections. The channel riffle facies was not recognized in cutbank sections. Scour pits, commonly observed on some bar surfaces, are produced by currents scouring around grounded ice blocks. Ice-block trails are produced by ice blocks dragged through soft sediment. (Knapp-USGS)
W74-10375

THE ALMA-ATA MUDFLOW OF JULY 15, 1973 (ALMATINSKIY SEL' 15 IYULYA 1973 G.),
Moscow State Univ. (USSR). Problemnaya Laboratoriya Nezhnykh Lavin i Selei.
S. M. Fleyshman, I. A. Mossakovskaya, and V. F. Perov.
Vestnik Moskovskogo Universiteta, Seriya V, Geografiya, No 2, p 35-39, March-April 1974. 1 fig, 6 ref.

Descriptors: *Mudflows, Mud, Solifluction, Glaciers.
Identifiers: *USSR(Alma-Ata region), Glacier lakes.

The mudflow which formed in the channel of the Malaya Almatinka River on July 15, 1973 was the thickest mudflow of record in the region of Alma-Ata. The total volume of the mudflow was more than 4.5 million cu m, of which at least 3 million cu m was a mass of mud and rock debris. Maximum surface velocity of the mudflow was estimated at 9-10 m/sec, and maximum discharge at a velocity of 6 m/sec was computed to be 1200 cu m/sec. The volume of the 1973 mudflow was more than twice that of the catastrophic mudflow of 1921, which destroyed a large section of the Kazakh capital. Conditions favoring the formation and main characteristics of the mudflow which passed down the Malaya Almatinka River on July 15, 1973 are analyzed. (Josefson-USGS)
W74-10376

CLAY MINERALS IN SEDIMENTS FROM THE NORTHWESTERN PART OF THE PACIFIC OCEAN (GLINISTYYE MINERALY V OSADKAKH SEVERO-ZAPADNOY CHASTI TIKHOGO OKEANA),
Akademiya Nauk SSSR, Moscow. Geologicheskii Institut.
N. A. Lisitsyna, B. P. Gradusov, O. A. Dvoretskaya, and N. P. Chizhikova.
Litologiya i Poleznyye Iskopayemyye, No 5, p 5-20, September-October 1973. 7 fig, 24 ref.

Descriptors: *Pacific Ocean, *Sediments, *Clay minerals, Illite, Montmorillonite, Kaolinite, Bottom sediments, Mineralogy, Petrology, Analytical techniques, Sampling, Profiles, Mapping, Zoning.
Identifiers: USSR, Chlorite, Diffractograms.

Fifty bottom-sediment samples were collected along a profile from the shores of Japan to the Marshall Islands and at several stations located southwest of the profile. Principal minerals in the finely dispersed part of the sediments are hydromica, montmorillonite, and mixed-layer formations related to them. These minerals reflect the compositional features of rocks of the source area. They are terrigenous, which is confirmed by the absolute age of hydromicas and feldspars in the sediments. The distribution of clay minerals in recent sediments is zonal: in the littoral zone the montmorillonite content is higher(>50%), while in the pelagic direction the hydromica content is higher (>50% in deep-sea pelagic clays). The effect of diagenetic processes on clay-mineral formation under oceanic conditions is limited by the process of glauconitization of sediments in the littoral and hemipelagic zones. Present areal distribution of clay minerals and lithofacies zones was determined mainly in the Quaternary period and has remained essentially the same for a long period of time, during which sedimentation features in the northwestern part of the Pacific were similar to those of the present. (Josefson-USGS)
W74-10382

URANIUM AND SEDIMENTATION IN THE BLACK AND AZOV SEAS (URAN V PROTSESSE OSADKOOBRAZOVANIYA V CHERNOM I AZOVSKOM MORYAKH),
Akademiya Nauk SSSR, Moscow. Institut Okeanologii.
G. N. Baturin.
Litologiya i Poleznyye Iskopayemyye, No 5, p 21-32, September-October 1973. 7 fig, 7 tab, 39 ref.

Descriptors: *Sedimentology, *Sedimentation, *Sediments, Clays, Sands, Silts, Sedimentation rates, Suspension, Suspended solids, Suspended load, Dissolved solids, Organic matter, Geologic time, Mapping, Sampling, Cores.
Identifiers: *USSR, *Black Sea, *Sea of Azov, *Uranium, Organic carbon, Ooze.

In rivers of the Azov-Black Sea Basin, uranium migrates mostly in solution. Uranium distribution in sediments of the Sea of Azov is relatively uniform. Its distribution in Black Sea sediments is highly inconsistent, where it generally duplicates the pattern of organic-carbon distribution. The uranium/organic carbon ratio in Black Sea sediments increases as the rates of sedimentation decline. Conditions favorable for uranium concen-

tration are missing in the Sea of Azov, which is a shallow body of water containing sediments frequently disturbed by storms. Principal factors of uranium concentration in deep-sea sediments of the Black Sea are mobility of uranium in river water, high organic-matter content in sediments, relatively complete extraction of uranium from the bottom layer of water by sediments, and low sedimentation rates in the halistatic zones. Uranium content in ooze water of Black Sea sediments reaches 0.000065 g/liter. (Josefson-USGS)
W74-10383

NEW DATA ON CARBONATE FORMATION IN LAKE BALKHASH (NOVYYE DANNYYE O KARBONATOOBRAZOVANII V OZ. BALKHASH),
Akademiya Nauk SSSR, Moscow. Geologicheskii Institut.
D. S Turovskiy, and A. B. Sheko.
Litologiya i Poleznyye Iskopayemyye, No 5, p 33-45, September-October 1973. 5 fig, 1 tab, 12 ref.

Descriptors: *Mineralogy, *Carbonates, *Calcite, *Dolomite, *Lake sediments, Sands, Silts, Mud, Lake basins, Lake stages, Water chemistry, Inorganic compounds, Salinity, Analytical techniques, Sampling, Cores, Mapping.
Identifiers: *USSR(Lake Balkhash).

To study mineral formation in sediments of Lake Balkhash, samples were collected from 180 research stations in different parts the lake during field work in 1970. Three hydrochemical characteristics of the lake were distinguished: (1) nonuniformity of mineralization and chemical composition of the water over the area of the lake; (2) distinct metamorphosis of the ionic composition of the water; and (3) presence of carbonate conditions of the magnesium-carbonate type. Fine silty muds are the predominant type of sediment and are found almost everywhere; their carbonate content is 42-60%. A distinctive feature of all Lake Balkhash seiments is their high carbonate content, which increases with the fineness of sediment grains. Authigenic carbonates in the surface layer of Balkhash sediments are represented by calcite and dolomite. Surface sediments in the western part of the lake differ from those in the east. In the west they are represented by gray and light-gray argillaceous and calcareous-argillaceous muds and in the east by calcareous-dolomitic muds. In the east, at a depth of 0.5-1.5 m, these muds are converted to deposits similar in lithologic and mineralogical composition to those of western reaches. Since its formation Lake Balkhash has passed through a number of stages ranging from a freshwater lake to an evaporite basin. While the western part of the lake has always been a freshwater basin, the eastern part exhibits three stages of development (saline basin, freshwater basin, and brackish basin) associated with changes in the salinity of water in this part of the lake. (Josefson-USGS)
W74-10384

SEDIMENT TRANSPORT IN RANDOM WAVES,
Delaware Univ., Newark. Dept. of Civil Engineering.
S. S. Liang, and H. Wang.
Available from NTIS, Springfield, Va 22161 as AD-772 106, Price $4.25 printed copy; $2.25 microfiche. College of Marine Studies Technical Report No 26, December 1973. 104 p, 24 fig, 5 tab, 41 ref, append. ONR Contract N00014-69-A0407.

Descriptors: *Sediment transport, *Surf, *Waves(Water), Bed load, Suspended load, Turbulence, Turbulent flow, Turbulent boundary layers, Simulation analysis, Computer programs, Mathematical models, Winds.

The mechanics of sediment transport under wave action were systematically investigated and the results were extended to a random wave field. The study applies only to regions well beyond the surf zone where the flow field, though irregular in appearance, is still amenable to mathematical expressions in gross terms. The flow field is artificially divided into two zones; the bed layer, and the internal flow region where viscosity can be neglected. The total sediment transport is calculated through matching boundary conditions of the two zones and by adding the bed load and suspended load movements. Computer programs facilitate calculations with overwater wind speed and sediment grain size as the major inputs. Test runs for sample cases indicate that the transport of suspended load dominates the process. (Knapp-USGS)
W74-10390

AN INVESTIGATION OF ELECTRO-OPTICAL TECHNIQUES FOR THE ANALYSIS OF SUSPENDED SEDIMENTS,
Delaware Univ., Newark. Coll. of Marine Studies.
M. L. Salter.
Available from NTIS, Springfield, Va 22161 as AD-773 140, Price $4.75 printed copy; $2.25 microfiche. Technical Report No 28, December 1973. 135 p, 13 fig, 2 tab, 107 ref. 4 append. ONR Contract N00014-69-A-0407.

Descriptors: *Particle size, *Suspended load, *Optical properties, *Electrical properties, Instrumentation, Refractivity, Clay minerals, Sea water, Water analysis.
Identifiers: *Optical scattering.

Electric fields in conjunction with optical scattering are proposed as a tool for the determination of particle size distributions of suspended minerals in water as well as for determining the relative concentrations of the different types of suspended minerals. The effect on light scattering of suspended sediments subjected to an applied electric field was calculated theoretically. The proposed technique depends upon Brownian motion which becomes appreciable for particles under three microns in diameter. (Knapp-USGS)
W74-10407

THE KINEMATICS OF WATER PARTICLE OF BREAKING WAVES WITHIN THE SURF ZONE,
Naval Postgraduate School, Monterey, Calif.
For primary bibliographic entry see Field 2E.
W74-10409

EROSION OF THE NORTH SHORE OF LONG ISLAND,
State Univ. of New York, Stony Brook. Marine Sciences Research Center.
D. S. Davies, E. W. Axelrod, and J. S. O'Connor.
Technical Report No 18, 1973. 101p, 55 fig, 15 tab, 99 ref.

Descriptors: *Beach erosion, *New York, *Erosion control, Surf, Waves(Water), Storms, Coasts, Coastal engineering, Sedimentation, Recreation.
Identifiers: *Long Island(NY), Nassau County(NY), Suffolk County(NY).

The erosion of beaches and bluffs of the north shores of Nassau and Suffolk Counties, Long Island, New York, is described. An inventory is provided of shoreline length, bluffs, dunes, sediment characteristics, summer beach profiles, shore zone vegetation, and manmade structures designed to modify natural processes. The influences of natural processes which continually modify these shoreline features are also described. These processes are sea level changes, winds, tides, littoral transport, and rain runoff. Emphasis is placed upon the major short-term influences of storms, including their frequences and intensities. The extremely expensive attempts of man to inhibit dynamic beach processes are often found to be unpredictable and either ineffective or detrimental. The features of beaches and the historical rates of erosion or accretion at 158 locations are summarized in a Beach Utility Index designed to guide the most rational use of specific shoreline reaches. In addition to estimates of erosion and accretion rates, this utility index summarizes at specific locations the natural barriers to erosion, beach width, sediment grain size of the forebeach and backbeach, and accessibility to the beach. Engineering structures designed to stabilize portions of the beach should not be constructed without detailed knowledge of their influences upon adjacent property. (Knapp-USGS)
W74-10440

DEVELOPMENT AND EROSION HISTORY OF BAYOCEAN SPIT, TILLAMOOK, OREGON,
Oregon State Univ., Corvallis. School of Oceanography.
For primary bibliographic entry see Field 2L.
W74-10618

COMPUTER ANALYSIS FOR ACOUSTIC SENSING OF MULTILAYER SEDIMENTS,
New Hampshire Univ., Durham. Dept. of Mechanical Engineering.
A. H. Maguson, G. K. Stewart, and A. K. Newman.
Available from NTIS, Springfield, Va. 22161 as COM-73-11908, Price $2.75 printed copy; $2.25 microfiche. Sea Grant Technical Report UNH-SG-111, July 1973. 6 p, 3 fig, 7 ref. NOAA Sea Grant DC 1-36114.

Descriptors: *Remote sensing, *Mathematical models, *Acoustics, *Bottom sediments, *Sediment-water interfaces, Sonar, Sounding, Seismic studies, Geophysics.

An analytical model proposed for application to the remote acoustic sensing of sediments on the continental shelf uses Green's function as a model for the acoustic response in the liquid layer overlying the sediment. The sediment stratification is represented as a series of discrete layers, each layer being a homogeneous viscoelastic solid. A recurrence relation eliminates potentials in the intermediate solid layers. After applying boundary conditions at the liquid-solid interface, the acoustic response is expressed as an improper integral. The recurrence relation reduces the multilayer problem to a form ideal for solution on the digital computer. The computer analysis of the problem is discussed and compared to previously obtained analytical solutions for the single-layer case. (Knapp-USGS)
W74-10637

ADSORPTION OF PHOSPHORUS BY LAKE SEDIMENT,
New Hampshire Univ., Durham.
For primary bibliographic entry see Field 5C.
W74-10642

A RESEARCH HYDRAULIC FLUME FOR MODELING DRIFTING SNOW - DESIGN, CONSTRUCTION AND CALIBRATION,
Cold Regions Research and Engineering Lab., Hanover, N.H.
For primary bibliographic entry see Field 2C.
W74-10644

HOLOCENE SEDIMENTARY ENVIRONMENT OF THE ATLANTIC INNER SHELF OFF DELAWARE,
Delaware Univ., Newark. Dept. of Geology.
R. E. Sheridan, C. E. Dill, Jr., and J. C. Kraft.
Geological Society of America Bulletin, Vol 85, No 8, p 1319-1328, August 1974. 13 fig, 7 ref.

Descriptors: *Sedimentation, *Coasts, *Continental shelf, *Delaware, Erosion, Geomorphology, Bottom sediments, Sounding, Stratigraphy, *Atlantic Ocean.

The marine areas immediately off Delaware's Atlantic coast were investigated to determine the geology of the shallow subsurface. High-resolution subbottom profiles were used to identify and map the pre-Holocene erosional surface in Delaware Bay and in the Atlantic Ocean off the Delaware coast. Vibracoring revealed the nature and age of the various seismic layers. Age identifications based on radiocarbon dating, on oxidation zones, and on lithologic characteristics confirm the partial retention of Holocene coastal environments under the inner shelf. The Holocene transgression across the ancient Rehoboth and Indian River lagoons involved erosion through the Holocene lagoonal sediments in some areas, leaving pre-Holocene ridges exposed on the inner-shelf sea floor. Where the ancient lagoonal deposits are thickest over depressions in the pre-Holocene surface, Holocene coastal sediments were retained. The barrier complex related to these earlier Holocene lago ons is projected on a paleographic reconstruction to be at least 12 km east of the present coast. The bottom morphological features of the inner shelf off Delaware are related to dynamic molding of hydraulic bedforms in equilibrium with the present marine environment. (Knapp-USGS)
W74-10669

INDICATIONS OF LONG TERM, TIDAL CONTROL OF NET SAND LOSS OR GAIN BY EUROPEAN COASTS,
Institute of Oceanographic Sciences, Wormley (England).
A. H. Stride.
Estuarine and Coastal Marine Science, Vol 2, No 1, p 27-36, January 1974. 7 fig, 17 ref.

Descriptors: *Sediment transport, *Coasts, *Tides, Littoral drift, Currents(Water), Sedimentary structures, Bed load, Continental shelf, Sand bars, Sand waves, *Europe.

Long sand banks elongated parallel with the main tidal flows are abundant in European seas. Most have one slope steeper than the other. In the majority of these sand banks the direction faced by the steeper slope corresponds with the sense of rotation of the tidal current vectors in relation to the net sand transport direction. This is the result of a lag effect in the picking up and deposition of fine sand through the tidal cycle. Portions of coast which are likely to be subject to a long term net sand loss or gain from the offshore zone may be predicted. (Knapp-USGS)
W74-10672

SHELF SEDIMENTS OFF CHESAPEAKE BAY: 1. GENERAL LITHOLOGY AND COMPOSITION,
Virginia Inst. of Marine Science, Gloucester Point.
For primary bibliographic entry see Field 2L.
W74-10678

LITERATURE REVIEW ON RESEARCH STUDY FOR THE DEVELOPMENT OF DREDGED MATERIAL DISPOSAL CRITERIA,
Texas Univ., Dallas. Inst. for Environmental Studies.
For primary bibliographic entry see Field 5B.
W74-10686

THE WATERS OF MEROM: A STUDY OF LAKE HULEH. III. THE MAJOR CHEMICAL CONSTITUENTS OF A 54 M. CORE,
Yale Univ., New Haven, Conn. Osborn Memorial Labs.
For primary bibliographic entry see Field 2H.
W74-10763

SOME CHARACTERISTIC FEATURES OF THE BACTERIAL DECOMPOSITION IN SEDIMENTS FROM LAKES AND PONDS IN SOUTHWEST GREENLAND (THE NARSSAQ AREA),
Copenhagen Univ. (Denmark). Inst. of Hygiene.
For primary bibliographic entry see Field 5C.
W74-10799

COMPUTER MODELING OF SEDIMENT AND PHOSPHORUS MOVEMENT INTO CANADARAGO LAKE,
Cornell Univ., Ithaca, N.Y. Dept. of Agronomy.
For primary bibliographic entry see Field 5B.
W74-10807

HYDROSTRATIGRAPHIC UNITS OF SURFICIAL DEPOSITS OF EAST-CENTRAL ILLINOIS,
Illinois Univ., Urbana. Dept. of Geology.
J. W. Vukovich.
M Sc Thesis 1967. 57 p, 13 fig, 2 tab, 25 ref.

Descriptors: Bedrock, Geologic formations, Distribution patterns, Distribution systems, Sediment distribution, Glacial sediments, Gravels, Sands, Till, *Glacial drift, *Groundwater, Geologic history, Drillers logs, *Illinois, *Stratigraphy.
Identifiers: *Mahomet Valley region(Ill), *Hydrostratigraphic units, Glacial deposits, Surficial deposits.

There are six hydrostratigraphic units present in the glacial drift of the Mahomet Valley region of east-central Illinois, which form a sequence of alternating till and sand and gravel units. The lowermost unit, Unit 1, is a thick sand and gravel which is confined to the lower portions of the bedrock channels. It is of Kansan and possibly Nebraskan age, and in some cases may include some sand and gravel of Illinoian age. Unit 2 is a sequence of till and sand. This unit is described as the Illinoian hydrostratigraphic unit. Unit 3 is a silty sand and gravel at the top of the Illinoian which is overlain in several places by the Sangamon soil zone. Unit 4 is the lower Woodfordian till which is a pink, silty till. Unit 5 is the proglacial sand and gravel associated with the upper Woodfordian till, Unit 6, which is exposed at the surface over most of the study area. Through interpretation of the available data it was possible to delineate various sand and gravel zones. It is commonly assumed that the sands and gravels in the glacial drift were scattered and not extensive, but it was found that in Units 3 and 5, the sands and gravels were much more continuous and extend over a larger area than was generally thought. Driller's logs were used in some parts of this study. (Staplin-NWWA)
W74-10852

2K. Chemical Processes

QUALITY OF SURFACE WATERS OF THE UNITED STATES, 1968: PARTS 9 AND 10, COLORADO RIVER BASIN AND THE GREAT BASIN.
Geological Survey, Washington, D.C.
For primary bibliographic entry see Field 7C.
W74-10353

THE OXIDATION RATE OF SULPHIDE IN SEA WATER,
Goteborg Univ., (Sweden). Dept. of Analytical Chemistry.
For primary bibliographic entry see Field 5B.
W74-10365

EARLY DIAGENESIS: EXPANSIBLE SOIL CLAY-SEA WATER REACTIONS,
State Univ., of New York, Binghamton. Dept. of Geological Sciences.
For primary bibliographic entry see Field 2J.
W74-10373

DISTRIBUTION OF ARSENIC IN DEEP GROUNDWATER OF THE MIDDLE CASPIAN ARTESIAN BASIN (K VOPROSU O RASPREDELENII MYSH'YAKA V GLUBOKIKH PODZEMNYKH VODAKH SREDNEKASPIYSKOGO ARTEZIANSKOGO BASSEYNA),
Vsesoyuznyi Nauchno-Issledovatelskii Institut Prirodnykh Gaza, Moscow (USSR)
For primary bibliographic entry see Field 5B.
W74-10379

RAIOCARBON IN GLACIAL WATER OF THE EL'BRUS REGION (RADIOUGLEROD V LEDNIKOVOY VODE PRIEL'BRUS'YA),
Akademiya Nauk URSR, Kiev. Institut Geokhimii i Fiziki Mineralov.
E. V. Sobotovich, N. N. Kovalyukh, G. N. Bondarenko, and Yu. V. Kuznetsov.
Geokhimiya, No 4, p 618-621, April 1973. 3 fig, 4 ref.

Descriptors: *Carbon radioisotopes, *Radioactive dating, *Age, *Glaciers, *Ice, Melt water, Firn, Rivers, Spring waters, Sampling, Analytical techniques, Instrumentation.
Identifiers: *USSR(El'brus Mountain).

Distribution of C-14 in waters of glacial origin and age of ice were determined in the region of the El'brus Mountain in the Caucasus. The specific activity of glacial samples of meltwater from a glacier crevasse, firn, Terskol River water, relict ice, and Narzan mineral spring water was 22.02, 21.08, 19.80, 13.03 and 0.33 disintegration/min/g of carbon. Radiocarbon age of relict ice was 340 plus or minus 50 years, and that of Narzan mineral spring water, 28,190 plus or minus 420 years. (Josefson-USGS)
W74-10380

PROBLEM OF THE ORIGIN OF HYDROGEN SULFIDE IN NATURAL WATERS (K PROBLEME GENEZISA SEROVODORODA PRIRODNYKH VOD),
Ustredni Ustav Geologicky, Brno (Czechoslovakia).
For primary bibliographic entry see Field 5B.
W74-10381

CLAY MINERALS IN SEDIMENTS FROM THE NORTHWESTERN PART OF THE PACIFIC OCEAN (GLINISTYYE MINERALY V OSADKAKH SEVERO-ZAPADNOY CHASTI TIKHOGO OKEANA),
Akademiya Nauk SSSR, Moscow. Geologicheskii Institut.
For primary bibliographic entry see Field 2J.
W74-10382

URANIUM AND SEDIMENTATION IN THE BLACK AND AZOV SEAS (URAN V PROTSESSE OSADKOOBRAZOVANIYA V CHERNOM I AZOVSKOM MORYAKH),
Akademiya Nauk SSSR, Moscow. Institut Okeanologii.
For primary bibliographic entry see Field 2J.
W74-10383

QUALITY OF SURFACE WATERS OF THE UNITED STATES, 1968: PARTS 12-16. NORTH PACIFIC SLOPE BASINS, ALASKA, HAWAII, AND OTHER PACIFIC AREAS.
Geological Survey, Washington, D.C.
For primary bibliographic entry see Field 5A.
W74-10616

QUALITY OF SURFACE WATERS OF THE UNITED STATES, 1968: PART 7. LOWER MISSISSIPPI RIVER BASIN.
Geological Survey, Washington, D.C.
For primary bibliographic entry see Field 5A.
W74-10617

X-RAY DIFFRACTION, ELECTRON MICROSCOPY, ELECTROPHORETIC MOBILITY, AND PH OF SOME STABLE SMECTITE-PROTEIN COMPLEXES,
New Hampshire Univ., Durham.
For primary bibliographic entry see Field 2G.
W74-10641

DETERMINATION OF CLAY SURFACE ACIDITY BY INFRARED SPECTROSCOPY,
Purdue Univ., Lafayette, Ind. Dept. of Agronomy.
For primary bibliographic entry see Field 2G.
W74-10643

CHEMICAL DATA FROM OREGON WATERS, 1972,
Oregon State Univ., Corvallis. School of Oceanography.
For primary bibliographic entry see Field 5B.
W74-10652

PRELIMINARY STUDY OF THE QUALITY OF WATER IN THE DRAINAGE AREA OF THE JEMEZ RIVER AND RIO GUADALUPE,
Los Alamos Scientific Lab., N. Mex.
For primary bibliographic entry see Field 5B.
W74-10658

DIFFUSION-INDUCED INSTABILITY IN MODEL ECOSYSTEMS: ANOTHER POSSIBLE EXPLANATION OF PATCHINESS,
Johns Hopkins Univ., Baltimore. Chesapeake Bay Inst.
For primary bibliographic entry see Field 5B.
W74-10662

ALKALI AND ALKALINE EARTH METALS: DISTRIBUTION AND LOSS IN A HIGH SIERRA NEVADA WATERSHED,
California Inst. of Tech., Pasadena. Div. of Geological and Planetary Sciences.
T. Hinkley.
Geological Society of America Bulletin, Vol 85, No 8, p 1333-1338, August 1974. 2 fig, 7 tab, 14 ref.

Descriptors: *Geochemistry, *Trace elements, Geomorphology, *Alpine, *California, Erosion rates, Weathering, Leaching, Snowpacks, Calcium, Potassium, Cesium, Strontium, *Alkali metals, *Alkaline earth metals.
Identifiers: Rubidium, Barium, *Sierra Nevada(Calif).

The geologic balance and distribution of two families of metals, K-Rb-Cs and Ca-Sr-Ba, were investigated in Thompson Canyon, an undisturbed watershed in the central crest region of the Sierra Nevada of California. In the source rock, two major minerals, microcline and plagioclase, and one minor mineral, biotite, contain most of the mass of these metals. Ca and Sr are being removed from the watershed as stream solute at a higher rate than the alkalies or Ba relative to their abundance in source rocks. Rapid breakdown of plagioclase and exchange mechanisms involving the soil may be responsible for this differential removal. As the snowpack ages in the late spring, it accumulates dusts on its surface, with metal ratios indicating that Thompson Canyon rocks and soils are the source of the dusts. The watershed is being denuded at a rate of less than 1 cm per 1,000 yr, and chemical removal is responsible for the bulk of this rate. (Knapp-USGS)
W74-10667

TEMPERATURE TRANSIENTS IN FLOWING BOREHOLES,
Oregon State Univ., Corvallis.
For primary bibliographic entry see Field 2F.
W74-10677

MICROWAVE AND SPECTRA OF SOME SULFUR AND NITROGEN COMPOUNDS,
National Aeronautics and Space Administration, Langley Station, Langley Research Center.
For primary bibliographic entry see Field 5A.
W74-10683

EVALUATION OF PROTOTYPE CRUSHED LIMESTONE BARRIERS FOR THE NEUTRALIZATION OF ACIDIC STREAMS,
Pennsylvania State Univ., University Park. Dept. of Civil Engineering.
For primary bibliographic entry see Field 5G.
W74-10693

NEUTRALIZATION OF ACIDIC WASTES BY CRUSHED LIMESTONE,
Pennsylvania State Univ., University Park. Dept. of Civil Engineering.
For primary bibliographic entry see Field 5G.
W74-10694

THE EFFECTS OF WATER CONTENT AND DENSITY ON THE ELECTRICAL RESISTIVITY OF SOIL,
Brooklyn Coll., N.Y. Dept. of Geology.
For primary bibliographic entry see Field 2G.
W74-10829

THE DISTRIBUTION OF MINOR ELEMENTS BETWEEN COEXISTING CALCITE AND DOLOMITE IN THE GASPORT MEMBER OF THE LOCKPORT FORMATION, LOCKPORT, NEW YORK,
New York State Univ., Buffalo.
For primary bibliographic entry see Field 2F.
W74-10861

HAMMAT GADER (ISRAEL): GEOCHEMISTRY OF A MIXED THERMAL SPRING COMPLEX,
Weizmann Inst. of Science, Rehovot (Israel).
For primary bibliographic entry see Field 2F.
W74-10880

ARSENIC-CONTAINING CARBONATED WATERS, OCCURRENCE PECULIARITIES, CHEMICAL COMPOSITION, OCCURRENCE CONDITIONS (MYSH'YAKSODERZHASHCHIYE UGLEKISLYE VODY KAVKOZA (OSOBENNOSTI RASPROSTRANENIYA, KHIMICHESKIY SOSTAV, USLOVIYA FORMIROVANIYA)),
All-Union Scientific Research Inst. of Hydrogeology and Engineering Geology, Moscow (USSR).
S. R. Krainov, G. A. Volkov, N. K. Petrova, and I. V. Baturinskaya.
Geokhimiia, No 2, p 212-227, 1974. 5 fig, 2 tab, 27 ref. English summary.

Descriptors: *Carbonate rocks, *Boron, *Chlorine, Arsenic compounds, Pollutant identification, Chemical reactions.
Identifiers: *Carbonated water, *Arsenic, Chemical mobility, Water enrichment, *USSR(Caucasus region).

The Caucasus is the largest Soviet province of carbonated arsenic-containing water. The water is confined to the youngest structures. It is characterized by high chlorinity and high As/Cl, As/B ratios. The mobility sequence in such water is Cl greater than or equal to As greater than B. The enrichment of carbonated water in arsenic is connected with local thermometamorphic processes of its extraction from rocks. These processes are intensified in the presence of chloride water. Carbonated water enrichment in arsenic is a process superimposed on chloride water and secondary in relation to it. (Sandoski-FIRL)
W74-10884

2L. Estuaries

EFFECT OF A LOW IMPERMEABLE GROIN ON SHOREZONE GEOMETRY AND TEXTURE, POINT MUGU, CALIFORNIA,
California Univ., Los Angeles. Dept. of Geography.
For primary bibliographic entry see Field 8B.
W74-10358

A FIELD INVESTIGATION OF THE HYDRAULICS AND STABILITY OF CORPUS CHRISTI WATER EXCHANGE PASS, TEXAS,
Texas A and M Univ., College Station. Dept. of Civil Engineering.
K. J. Defehr, and R. M. Sorensen.
Available from NTIS, Springfield, Va. 22161 as AD-773 043, Price $4.50 printed copy; $2.25 microfiche. Coastal, Hydraulic and Ocean Engineering Group Report, Contract Report (C.O.E. Report No 170), August 1973. 114 p, 59 fig, 9 tab, 21 ref, 3 append.

Descriptors: *Inlets(Waterways), *Bays, *Sedimentation, *Beach erosion, *Coastal engineering, Streamflow, Tides, Winds, Waves(Water), Surges, Storm surges, *Texas, Gulf of Mexico.
Identifiers: *Corpus Christi Bay(Texas).

Corpus Christi Water Exchange Pass, an artificial tidal inlet connecting the southeast corner of Corpus Christi Bay, Texas with the Gulf of Mexico, was studied to determine the hydraulic characteristics of the inlet, its response to various physical processes, and the nature of its stability. Field work included current measurements, collection and analysis of sediment samples, and measurements of tidal fluctuations in the inlet and Corpus Christi Bay. Tidal data for the Gulf of Mexico and Corpus Christi Bay and weather data were analyzed along with the field data. The inlet has experienced shoaling in the vicinity of the gulf and bay mouths since its completion in August 1972. The bay shoreline has eroded near the inlet. A designed channel bend is partially responsible for erosion of the south bank of the inlet. Wind setup, induced by the passage of cold fronts, influences flow velocities. (Knapp-USGS)
W74-10361

THE OCCURRENCE OF GLAUCONITE IN MONTEREY BAY, CALIFORNIA, DIVERSITY, ORIGINS, AND SEDIMENTARY ENVIRONMENTAL SIGNIFICANCE,
California Univ., Santa Cruz. Earth Science Board.
J. R. Hein, A. O. Allwardt, and G. B. Griggs.
Journal of Sedimentary Petrology, Vol 44, No 2, p 562-571, June 1974. 5 fig, 4 tab, 16 ref.

Descriptors: *Sedimentation, *Bays, *California, *Bottom sediments, *Clay minerals, Sedimentology, Regime, Sediment transport, Provenance, Clays, Mineralogy, Deposition(Sediments), Diagenesis.
Identifiers: *Glauconite, *Monterey Bay(Calif).

Sediment transport, sedimentation rate and the energy due to currents and waves distinguish three distinct environments in Monterey Bay, California: the continental shelf, the continental slope or walls of Monterey Submarine Canyon and the floor of the canyon. Glauconite pellet abundance coupled with its morphologic variability can be used to decipher, and in fact are controlled by, the energy regime of each individual sedimentary environment. Glauconite does not steadily increase in a seaward direction. Pellet morphologies and cleavage studied from scanning electron photomicrographs and X-ray diffraction data suggest several parent materials, even within a single sample. (Knapp-USGS)
W74-10370

COASTAL PROCESSES AND DEPOSITIONAL PATTERNS ON CAPE ANN, MASSACHUSETTS,
Williams Coll., Williamstown, Mass.
For primary bibliographic entry see Field 2J.
W74-10371

DYNAMIC RELATIONSHIP BETWEEN HYDRAULICS AND SEDIMENTATION IN THE ALTAMAHA ESTUARY,
Tulsa Univ., Okla. Dept. of Geology.
G. S. Visher, and J. D. Howard.
Journal of Sedimentary Petrology, Vol 44, No 2, p 502-521, June 1974. 26 fig, 2 tab, 19 ref. NSF Grant GA1635.

Descriptors: *Sedimentation, *Estuaries, *Sedimentary structures, *Georgia, Sand waves, Tides, Tidal streams, Stratigraphy, Saline water intrusion, Saline water-freshwater interfaces, Sediment transport, Ripple marks, Dunes.
Identifiers: *Altamaha Estuary(GA).

Flood and ebb tidal cycles in the Altamaha Estuary produce differing bedforms, sedimentary structures, thicknesses of sedimentary units, and grain size distributions. Differences are the result of changes in bed shear, flow regime, and mechanisms of sediment transport. The salt wedge developed on flood cycles produces a stratified estuary with highest flow velocity below the highest rate of salinity change. This relation results in upper flow regime as predicted by the densimetric Froude relation; trochoidal in phase waves to 2 m in height are formed. Surface waves and internal waves are seen in the salinity stratification. Ebb flow modifies the sand wave surface, and sediment transport is by ripples and dunes in the lower flow regime. Large-scale planar cross-bedding is produced by floodflow; small-scale ripple and dune structures are developed by ebb flow. The estuary is an effective mechanism for size segregation. Suspension populations are removed by both floodflow and ebbflow. There is a net inland transport of suspended sediment with deposition on tidal flats and marshes. A single log-normal source population is fractionated into several differing populations by bedload transport, suspension and recycling during successive tidal cycles. Characteristic log-probability size distributions are developed in different environments. (Knapp-USGS)
W74-10372

SEDIMENT TRANSPORT IN RANDOM WAVES,
Delaware Univ., Newark. Dept. of Civil Engineering.
For primary bibliographic entry see Field 2J.
W74-10390

FLUSHING AND WATER QUALITY CHARACTERISTICS OF SMALL-BOAT MARINAS,
Washington Univ., Seattle. Dept. of Civil Engineering.
For primary bibliographic entry see Field 5B.
W74-10419

SEA ICE CONDITIONS IN THE COOK INLET, ALASKA DURING THE 1971-72 WINTER,
National Weather Service, Anchorage, Alaska.
For primary bibliographic entry see Field 2C.
W74-10428

OREGON'S NEARSHORE OCEAN,
Oregon State Univ., Corvallis. Marine Advisory Program.
J. E. McCauley.
Available from NTIS, Springfield, Va 22161 as COM-74-10226, price $3.00 printed copy; $2.25 microfiche. Extension Service Sea Grant Report No 16, November 1973. 8 p, 6 fig, 4 photo, 5 ref.

Descriptors: *Oregon, *Coasts, *Environment, *Intertidal areas, Oceans, Productivity, Beaches, Habitats, Water quality, Aquatic habitats.

The relatively straight coastline of Oregon runs in a north-south direction. Headlands and coves interrupt this straight line locally, and rivers cut across it. The coastline is composed of sandy beaches alternating with rocky headlands. The beaches generally lie at the base of bluffs that are seldom high except in southern Oregon. Some coastal bluffs may be separated from the ocean by sand dunes. The beaches are made up of quartz and feldspar sand; they generally lack the shells and shell fragments that occur on beaches in many parts of the world. The shifting sands do not provide a good attachment base for plants and animals. In sharp contrast to the beaches, rock headlands support rich intertidal biological areas. Interplay of physical, chemical, and biological forces makes rocky intertidal regions of the Pacific Northwest among the most productive spots in the world. The sea floor is composed largely of sands similar to those found on the beaches. In the first few miles from the coast these sands become increasingly finer, but within 5 miles of the coast there is almost no mud. Gravel and rocks may be found off the mouths of streams. The coastal waters of the Pacific Northwest are still relatively clean. (Knapp-USGS)
W74-10431

RHODE ISLAND'S OCEAN SANDS: MANAGEMENT GUIDELINES FOR SAND AND GRAVEL EXTRACTION IN STATE WATERS,
Rhode Island Univ., Kingston. Coastal Resources Center.
For primary bibliographic entry see Field 5G.
W74-10437

EROSION OF THE NORTH SHORE OF LONG ISLAND,
State Univ. of New York, Stony Brook. Marine Sciences Research Center.
For primary bibliographic entry see Field 2J.
W74-10440

THE NORTH SEA,
Deutsches Hydrographisches Institut, Hamburg (West Germany).
For primary bibliographic entry see Field 5B.
W74-10513

LEGAL ASSURANCES OF ADEQUATE FLOWS OF FRESH WATER INTO TEXAS BAYS AND ESTUARIES TO MAINTAIN PROPER SALINITY LEVELS,
Texas Univ., Austin. School of Law.
For primary bibliographic entry see Field 6E.
W74-10549

DEVELOPMENT AND EROSION HISTORY OF BAYOCEAN SPIT, TILLAMOOK, OREGON,
Oregon State Univ., Corvallis. School of Oceanography.
T. A. Terich, and P. D. Komar.
Available from NTIS, Springfield, Va 22161 as COM-74-10077 Price $4.75 printed copy; $2.25 microfiche. Reference 73-16, September 1973. 145 p, 47 fig, 7 tab, 59 ref, append.

Descriptors: *Beach erosion, *Sand spits, *Oregon, Littoral drift, Coasts, Sand bars, Sediment transport, Sedimentation, Erosion, Jetties, Coastal engineering.
Identifiers: *Boyocean Spit(Oreg), *Tillamook Bay(Ore).

Sever erosion of Bayocean spit, Oregon led to its breaching in 1952 and forcing the abandonment of a deteriorated resort. The erosion appeared to have been initiated by the construction and subsequent lengthening of a north jetty to the Tillamook Bay channel. Rapid sand deposition north of the north jetty indicated that the structure had blocked longshore sand transport, thus depriving the spit of sand and resulting in erosion. Analysis of historical shoreline changes and aerial photographs taken in 1971, 1972, and 1973 show that sand eroded from beaches to the north and to the south of the jetty has been transported and deposited immediately adjacent to both sides of the structure. This symmetrical pattern of erosion and deposition on both sides of the jetty indicates a reversing longshore sand transport with a near-zero net annual drift. The shoreline conditions at Bayocean demonstrate that beach erosion can result from the construction of a jetty transverse to a seasonally reversing longshore sand transport with a near-zero net drift. (Knapp-USGS)
W74-10618

COLLECTION AND ANALYSIS OF REMOTELY SENSED DATA FROM THE RHODE RIVER ESTUARY WATERSHED,
Smithsonian Institution, Edgewater, Md. Chesapeake Bay Center for Environmental Studies.
D. W. Jenkins.
Available from NTIS, Springfield, Va 22161 as N-74-12166 Price $6.75 printed copy; $2.25 microfiche. National Aeronautics and Space Administration Contract Report No NASA CR-62097, 1972. 95 p, 10 fig, 11 tab, 21 ref. Contract No NAS 6-1913.

Descriptors: *Remote sensing, *Estuaries, *Land use, *Chesapeake Bay, Erosion, Turbidity, Farming, Aerial photography, Ecology, Forests, *Maryland.
Identifiers: *Rhode River(Md).

Remote sensing was tested on the watershed of Rhode River, a small sub-estuary of the Chesapeake Bay, as a representative test area for a study over the entire Bay. A broad program of ecological research was already underway on the watershed. A total of 17 overflights were made, thirteen flights at low altitudes (1,200-5,000 feet). The low level flights used natural color and infrared color film. The remaining flights included one at 60,000 feet with natural and infrared color film, a flight at 5,000 feet with film and a multispectral scanner, two flights using a modified AM-AAS-18 MAIRS thermal scanner at 2,000 feet, and an RC-8 sensor with natural color film at 3,000 feet. The most useful flight data for current research proved to be the 9 x 9 inch transparancies of natural color and infrared color film. Both film types were effective for interpreting natural and cultivated vegetation, but natural color was superior for distinguishing species if haze conditions were negligible. Infrared color was best for detecting drainage patterns and evergreen species in winter, while natural color was preferable for interpretation of estuarine conditions. Applications for low level natural color and infrared color film included construction of a drainage map and vegetation map; photo-interpretation of deciduous forest vegetation, salt marsh vegetation, and cultivated fields; and detection of estuarine erosion and siltation patterns. (Knapp-USGS)
W74-10622

REMOTE SENSING REPORT, SAN FRANCISCO BAY AREA, APRIL-JULY 1972. VOLUME I.
National Field Investigations Center-Denver, Colo.
For primary bibliographic entry see Field 5A.
W74-10654

A PRELIMINARY ASSESSMENT OF THE ENVIRONMENTAL VULNERABILITY OF MACHIAS BAY, MAINE TO OIL SUPERTANKERS,
Massachusetts Inst. of Tech., Cambridge.
For primary bibliographic entry see Field 5C.
W74-10656

DIFFUSION-INDUCED INSTABILITY IN MODEL ECOSYSTEMS: ANOTHER POSSIBLE EXPLANATION OF PATCHINESS,
Johns Hopkins Univ., Baltimore. Chesapeake Bay Inst.
For primary bibliographic entry see Field 5B.
W74-10662

HOLOCENE SEDIMENTARY ENVIRONMENT OF THE ATLANTIC INNER SHELF OFF DELAWARE,
Delaware Univ., Newark. Dept. of Geology.
For primary bibliographic entry see Field 2J.
W74-10669

SEA WATER SYSTEM FOR AQUACULTURE OF ESTUARINE ORGANISMS AT THE SKIDAWAY INSTITUTE OF OCEANOGRAPHY,
Skidaway Inst. of Oceanography, Savannah, Ga.
For primary bibliographic entry see Field 5D.
W74-10670

INDICATIONS OF LONG TERM, TIDAL CONTROL OF NET SAND LOSS OR GAIN BY EUROPEAN COASTS,
Institute of Oceanographic Sciences, Wormley (England).
For primary bibliographic entry see Field 2J.
W74-10672

SHELF SEDIMENTS OFF CHESAPEAKE BAY: 1. GENERAL LITHOLOGY AND COMPOSITION,
Virginia Inst. of Marine Science, Gloucester Point.
M. M. Nichols.
Available from NTIS, Springfield, Va 22161 as COM-73-11274 Price $3.00 printed copy; $2.25 microfiche. Special Scientific Report 64, April 1972. 20 p, 2 fig, 8 ref, 3 append.

Descriptors: *Sedimentology, *Sediments, *Marine geology, *Chesapeake Bay, Sands, Sampling, Petrology, Geology.
Identifiers: Inner shelf.

A survey of sedimentary materials and bottom topography for more than 2400 square miles of the inner continental shelf floor north off the Chesapeake Bay entrance delineates several localities which contain concentrations of dark minerals, shell and gravel. Sediments consist of two principal types: (1) fine sand and (2) medium to coarse sand. The fine sand is grey-colored, subrounded, rich in quartz and relatively clean and well sorted. The medium coarse sand is typically ironstained, rich in shell and poorly sorted. The fine sand covers inner parts of the shelf floor whereas medium to coarse sand occurs on isolated ridges of inner parts. (Humphreys-ISWS)
W74-10678

MARINE RESOURCES -- A NATIONAL PERSPECTIVE,
National Oceanic and Atmospheric Administration, Washington, D.C. Office of Coastal Environment.
For primary bibliographic entry see Field 6E.
W74-10732

THE COAST GUARD MARINE ENVIRONMENTAL PROTECTION PROGRAM,
Coast Guard, Washington, D.C. Marine Environmental Protection Div.
For primary bibliographic entry see Field 5G.
W74-10773

REGIONALIZATION IN THE DELAWARE RIVER ESTUARY,
Delaware River Basin Commission, Trenton, N.J. Water Quality Branch.
For primary bibliographic entry see Field 5D.
W74-10775

PHOSPHATES IN SEDIMENTS OF PAMLICO ESTUARY,
North Carolina Univ., Chapel Hill. Dept. of Environmental Sciences and Engineering.
For primary bibliographic entry see Field 5C.
W74-10804

PRIMARY PRODUCTION: FRESHWATER ECOSYSTEMS,
Cornell Univ., Ithaca, N.Y. Section of Ecology and Systematics.
For primary bibliographic entry see Field 5C.
W74-10805

NUTRIENT RETENTION IN SALT MARSH PLOTS EXPERIMENTALLY FERTILIZED WITH SEWAGE SLUDGE,
Boston Univ., Woods Hole, Mass. Marine Biological Lab.
For primary bibliographic entry see Field 5C.
W74-10809

OREGON'S SUBMERGED AND SUBMERSIBLE LANDS.
Oregon Advisory Committee to the State Land Board, Salem.
For primary bibliographic entry see Field 6E.
W74-10874

3. WATER SUPPLY AUGMENTATION AND CONSERVATION

3A. Saline Water Conversion

ANALYSIS OF A DUAL MODE DESALINATION SYSTEM FOR NAVAL BASES,
Naval Civil Engineering Lab., Port Hueneme, Calif.
E. E. Cooper.
Available from NTIS, Springfield, Va 22161 as AD-764 055, Price $4.50 printed copy; $2.25 microfiche. Technical Note N-1285, May 1973. 48 p, 10 fig, 7 tab, 22 ref.

Descriptors: *Desalination, *Sea water, *Reverse osmosis, *Flash distillation, Descaling, Cost-benefit analysis, Water costs, Water treatment, Waste water treatment.

A dual mode desalination device combines a reverse osmosis unit and a multistage flash distillation unit. The function of the reverse osmosis unit is to remove sufficient amounts of scaling salts from intake seawater to allow scale-free operation of the flash distillation unit at temperatures up to 350 deg F. Substantially higher membrane reliability can be expected if the saline water is pressurized to only 600-800 psi rather than the normal 1100-1500 psi used with seawater. At 600-800 psi, specially blended 'open' cellulose acetate membranes or an ion exchange membrane can reject the necessary percentage of scaling salts with sufficient water flux to feed the flash distillation unit. Thus the dual mode desalination appears technically feasible. An economic evaluation of the dual mode device, however, reveals that the cost of its product water would be higher than that from a conventional 250 deg F flash distillation unit. (Knapp-USGS)
W74-10404

TEST AND EVALUATION OF AN 80,000 GPD REVERSE OSMOSIS SEAWATER DESALINATION PLANT MOUNTED ON AN AMMI PONTOON,
Naval Civil Engineering Lab., Port Hueneme, Calif.
C. K. Smith, and R. S. Chapler.
Available from NTIS, Springfield, Va 22161 as AD-774 473, Price $3.25 printed copy; $2.25 microfiche. Technical Note N-1299, January 1974. 46 p, 19 fig, 2 tab. Project No 64-043.

Descriptors: *Desalination, *Reverse osmosis, *Military aspects, *Sea water, Water treatment, Waste water treatment.

A reverse osmosis seawater desalination plant installed on a pontoon was tested by the Naval Facilities Engineering Command. The major components of the plant tested and evaluated by NCEL were all commercially available at the time the plant was designed and constructed. The individual components used performed satisfactorily in general. The first stage of each system did not contain enough modules to permit operation at seawater temperatures as low as those that exist in many locations. This made it necessary to operate at feed pressures that proved to be marginal for the membrane tube and seal design, and to add an inefficient interstage tank top-off system to avoid staravation of the second stage. Instrumentation with which the locations of modules containing failed membrane tubes could be quickly located was not an integral part of the plant, and diagnosis and repair took far too long to accomplish. With adequate diagnostic instrumentation, the ability to by-pass modules for repair without shutting down the system would have been valuable. (Knapp-USGS)
W74-10405

WATER AND POLITICS IN COASTAL CALIFORNIA - THE DIABLO CANYON EXPERIENCE,
Washington Univ., Seattle. Dept. of Political Science.
For primary bibliographic entry see Field 5D.
W74-10480

FILAMENT WOUND REVERSE OSMOSIS TUBES,
Secretary of the Interior, Washington, D.C. (assignee)
For primary bibliographic entry see Field 8C.
W74-10490

FREEZE PROCESS FOR MAKING FRESH WATER FROM BRINE,
Mitsui Shipbuilding and Engineering Co., Ltd., Tokyo (Japan).
Y. Nagashima, K. Hayashi, M. Inoue, T. Yamazaki, and S. Maeda.
U S Patent No 3,803,860, 5 p, 1 fig, 3 ref; Official Gazette of the United States Patent Office, Vol 921, No 3, p 927, April 16, 1974.

Descriptors: *Patents, *Desalination, *Water treatment, *Freezing, *Deaeration, Brine, Fresh water, Separation techniques.

Brine is subjected to deaeration and cooling. The cooled brine is fed into a crystallization tank. The brine is contacted with a refrigerant and forms ice particles which are introduced into a washing tower where the ice particles are separated from the brine. The ice particles are then led into a melting tank where they melt into fresh water. The fresh water then passes through a deaerator, and, if necessary, through an adsorber to further remove the refrigerant which might have been retained. (Sinha-OEIS)
W74-10588

COMBINATION CONDENSER-DEGASSER-DEAERATOR FOR A DESALINATION PLANT,
General Electric Co., Bridgeport, Conn.
T. C. Carnavos.
U.S. Patent No 3,803,001, 4 p, 2 fig, 6 ref; Official Gazette of the United States Patent Office, Vol 921, No 2, p 695, April 9, 1974.

Descriptors: *Patents, *Desalination, *Water treatment, *Vapor compression distillation, Deaeration, Equipment, Condensation, Water vapor.
Identifiers: Degassers.

The combination consists of a vessel having collection and supply chambers, a tube bundle draining into the collection chamber, a distillation collection tank, a nozzle, and conduits. One conduit conducts vapor from the plant over the outside of the tubes, another conduit conducts condensed vapor from around the tubes into the distillate collection tank. A vacuum system is connected to the vessel and plant to remove noncondensibles and uncondensed vapor. Thus vapor from the last stage of a thermal-type desalination plant is condensed into product water. Feedwater is degassed and deaerated in thin films over vertical fluted heat transfer surfaces. (Sinha-OEIS)
W74-10596

A BILL TO AUTHORIZE PROVISIONS OF THE INTERNATIONAL BOUNDARY AND WATER COMMISSION.
House, Washington, D.C.
For primary bibliographic entry see Field 6E.
W74-10737

3B. Water Yield Improvement

A TWO-DIMENSIONAL WARM FOG MODIFICATION MODEL,
Geomet, Inc., Rockville, Md.
For primary bibliographic entry see Field 2B.
W74-10359

TOWN 'CAPTURES' NATURAL SPRING: CUTS WATER TREATMENT COSTS,
Allen and Hoshall, Memphis, Tenn.
For primary bibliographic entry see Field 5F.
W74-10567

WATER REGIMEN AND NITROGEN AND PHOSPHORUS METABOLISM IN PLANTS AFFECTED BY CHLOROCHOLINECHLORIDE (CCC), (IN RUSSIAN),
Akademiya Nauk SSR, Moscow. Inst. of Plant Physiology.
For primary bibliographic entry see Field 3F.
W74-10604

LABORATORY INVESTIGATION OF ELECTRICAL DISSIPATION OF WARM FOG,
Naval Postgraduate School, Monterey, Calif.
L. B. Herman.
Available from NTIS, Springfield, Va 22161 as AD-775 029 Price $7.75 printed copy; $2.25 microfiche. M Sc Thesis, December 1973. 90 p, 15 fig, 4 tab, 46 ref, 2 append.

Descriptors: *Fog, *Weather modification, *Electrical studies, *Electrical coronas, Cloud physics, Laboratory tests.
Identifiers: Fog clearing.

Fog clearing by electrical means was studied in a 27-cubic-foot fog chamber. Fogging of the chamber was accomplished with a spray nozzle driven by pre-humidified air, producing water droplets ranging from 10 to 75 micrometers. A corona discharge head in the center of the chamber was operated from 0 to 100 kV and measurements of fog conditions were made optically and with coated slides placed at various positions in the chamber. Rapid clearing was caused by the corona discharge. The dominant clearing mechanisms identified were coalescence and pushing of charged droplets to the walls of the chamber; the small size of the chamber precluded determination of which mechanism would be most important in large-scale fog clearing. (Knapp-USGS)
W74-10623

EVALUATION OF A METHOD OF FOG DISPERSAL BY IONIZATION,
California State Div. of Highways, Sacramento. Transportation Lab.
G. R. Bemis, K. O. Pinkerman, and E. C. Shirley.
Available from NTIS, Springfield, Va. 22161 as PB-229 334, Price $4.25 printed copy; $2.25 microfiche. California Division of Highways, Research Report CA-DOT-TL-7128-1-73-23, July 1973. 25 p, 10 fig, 5 ref, append.

Descriptors: *Fog, *Surfactants, *Weather modification, *Ionization, *California, Clouds.
Identifiers: Fog dispersal.

A truck-mounted system for fog dispersal using ionized surfactant was evaluated. The amount of time required for an untreated fog in a chamber to attain a reference visibility (450 ft as estimated by a human observer) was compared to the time required for a treated fog to reach the same reference visibility. The time required to reach 450 ft in the untreated fog was not significantly different than the time required to reach 450 ft with any applications of dispersal treatment. (Knapp-USGS)
W74-10639

A HISTORY OF AIR WEATHER SERVICE WEATHER MODIFICATION, 1965-1973,
H. A. Chary.
Available from NTIS, Springfield, Va. 22161 as AWS-TR-74-247, Price $3.00 printed copy; $2.25 microfiche. Air Force Air Weather Service Technical Report 74-247, June 1974. 25 p, 19 fig, 25 ref.

Descriptors: *Weather modification, *Fog, *Military aspects, *Cloud seeding, Ice fog, Clouds, Meteorology, Reviews, Aircraft, History.
Identifiers: Air Weather Service(USAF).

The history and development of the U. S. Air Force Air Weather Service capabilities in weather modification are reviewed. During the first 8 years of Air Weather Service efforts in weather modification, techniques were developed for cold fog dissipation and for precipitation augmentation. Attacks on the problems of warm and ice fog were less successful. In addition to field testing techniques and materials for possible Air Force and Army use, the Air Weather Service monitors all aspects of weather modification so that present capabilities can be improved and new capabilities can be added. Starting in 1965 with cakes of dry ice suspended from ballons, then testing vented liquid carbon dioxide, vented liquid propane, and silver iodide, AWS developed a ground based cold fog dissipation system. Three such systems, all using vented propane, are now operational. In 1967, AWS undertook airborne dissipation of cold fog by seeding with crushed dry ice. AWS investigations into warm fog dissipation started in 1968 when jet engines were used to clear warm fog temporarily from the Travis AFB runway. Subsequently several tests were run using hygroscopics and helicopter downwash. Precipitation augmentation for drought relief was used twice. AWS participated in such programs in the Philippines and in Texas. AWS's current operational weather modification capabilities include airborne and groundbased cold fog dissipation and precipitation augmentation. (Knapp-USGS)
W74-10675

RADAR IN WEATHER MODIFICATION AND HAIL CONTROL,
M. T. Abshayev, G. V. Vasil'yev, A. Dadali, and M. M. Shamis.
Available from NTIS, Springfield, Va 22161 as JPRS 60573, Price $3.00 printed copy; $2.25 microfiche. Joint Publications Research Service Publication 60573, November 1973. 23 p.

Descriptors: *Radar, *Hail, *Weather modification, Instrumentation, Meteorology, Calibrations, Cloud physics.
Identifiers: *USSR, Hail control.

This translation contains 2 articles on the procedure and apparatus for measuring the attenuation of radar radiation in clouds and precipitation and on problems of radar measurements of hail. (See W74-10688 and W74-10689) (Knapp-USGS)
W74-10687

PROCEDURE AND APPARATUS FOR MEASURING THE ATTENUATION OF RADAR RADIATION IN CLOUDS AND PRECIPITATION,
M. T. Abshayev, Yu. A. Dadali, and M. M. Shamis.
In: Radar in Weather Modification and Hail Control; Joint Publications Research Service Publication 60573, p 1-14, November 1973. 5 fig, 6 ref. (Translation of Vysokogornyy Geofizicheskiy Institut Trudy, No 20, Aktivnyye Vozdeystviya na Gradovyye Protsessy, p 114-126, 1972.)

Descriptors: *Radar, *Hail, *Weather modification, Instrumentation, Meteorology, Calibrations, Cloud physics.
Identifiers: *USSR, Hail control.

Radar may be used for measuring precipitation, the microstructure and water content of clouds, hail and thunderstorm indications and wind. The primary information is obtained by interpretation of such characteristics as the intensity and the Doppler frequency shift of the echo. Procedure and the apparatus used in the USSR for automating the measurements of attenuation as distribution in precipitation and cloud zones are described. (See also W74-10687) (Knapp-USGS)
W74-10688

PROBLEMS OF TECHNICAL REALIZATION OF RADAR MEASUREMENTS OF HAIL,
G. V. Vasil'yev, and M. T. Abshayev.
In: Radar in Weather Modification and Hail Control; Joint Publications Research Service Publication 60573, p 15-23, November 1973. 2 fig, 1 tab, 4 ref. (Translation of Vysokogornyy Geofizicheskiy Institut Trudy, No 21, Fizika Oblakov, p 168-175, 1972.)

Descriptors: *Radar, *Hail, *Weather modification, Instrumentation, Meteorology, Calibrations, Cloud physics.
Identifiers: *USSR, Hail control.

Radar devices used in the USSR for meteorological observations can detect a hail center in a cloud and measure its parameters. These data are necessary for practical cloud modification to prevent hailstorms. The method developed at the High Altitude Geophysics Institute is based on measuring the ratio of the radar reflectivity of a unit volume of the cloud for two wavelengths. (See also W74-10687) (Knapp-USGS)
W74-10689

PRACTICES IN DETENTION OF URBAN STORMWATER RUNOFF,
Poertner (Herbert G.), Bolingbrook, Ill.
For primary bibliographic entry see Field 4A.
W74-10696

REPORT ON THE LAMBOURN VALLEY PILOT SCHEME, 1967-1969,
Thames Conservancy, Reading (England).
For primary bibliographic entry see Field 4B.
W74-10862

CHEMICAL METHOD OF PREVENTING LOSS OF INDUSTRIAL AND FRESH WATERS FROM PONDS, LAKES AND CANALS,
Dow Chemical Co., Tulsa, Okla. Dowell Div.
For primary bibliographic entry see Field 4A.
W74-10883

3C. Use Of Water Of Impaired Quality

LONG-TERM EFFECTS OF IRRIGATION-SALINITY MANAGEMENT ON A VALENCIA ORANGE ORCHARD,
Dept. of Soil Science and Agricultural Engineering. Univ. of California, Riverside.
F. T. Bingham, R. J. Mahler, J. Parra, and L. H. Stolzy.
Soil Science, Vol 117, No 6, p 369-377, 1974. UCAL-WRC-W-124.

Descriptors: *Irrigation effects, *Saline soils, *Oranges, Citrus fruits, *California orchards, Alkaline soils, Root zone, *Salinity, *Salt tolerance, Salts, *Crop production.
Identifiers: *Fruit tree growth.

Fruit production and tree growth characteristics of a Valencia orange orchard are related to equilibrium distribution of salts throughout the root profile in response to uniform applications of irrigation waters varying in salinity and sodicity hazards. Eight years of differential irrigation treatments consisting of basin irrigation with four waters representing low to moderately high salinity, and also with CL and SO4 waters, resulted in soil salinity profiles specific for each water. Both the quantity and quality of oranges have declined under irrigation treatments producing accumulation of soluble salts within the root zone. Specific ion, osmotic, and soil suction effects are discussed in relation to salinity stress. (Snyder-California, Davis)
W74-10420

DOMESTIC WASH WATER RECLAMATION FOR REUSE AS COMMODE WATER SUPPLY USING A FILTRATION--REVERSE OSMOSIS SEPARATION TECHNIQUE,
National Aeronautics and Space Administration, Langley Station, Va. Langley Research Center.
For primary bibliographic entry see Field 5D.
W74-10478

TAILWATER,
T. Milligan.
Irrigation Age, Vol 7, No 5, p 6-7, December, 1972. 4 fig.

Descriptors: *Runoff, *Tailwater, *Return flow, Irrigation practices, Furrow irrigation, Water conservation, Soil conservation, Farm ponds, *Water reuse, *Texas.
Identifiers: Reuse systems.

Economics of tailwater reuse on the Texas plains are discussed. Surveys show that much of the water required for adequate furrow irrigation is wasted at the end of the fields. When 3 to 4 wells contributed to one reuse system, it was found that the system will return as much water as one well will produce. This system thus produced a water savings of 25-30%. Tips on the construction and operation of the reuse system are presented. (Skogerboe-Colorado State)
W74-10760

3D. Conservation In Domestic and Municipal Use

MODELING THE TOTAL HYDROLOGIC-SOCIOLOGIC FLOW SYSTEM OF URBAN AREAS,
Utah State Univ., Logan. Inst. for Social Science Research on Natural Resources.
For primary bibliographic entry see Field 4C.
W74-10351

PROBLEMS OF WATER SUPPLY OF AN INDUSTRIAL TOWN NEAR A WATERSHED (PROBLEMY VODOSNABZHENIYA PRIVODORAZDEL'NOGO PROMYSHLENNOGO GORODA),
Moscow State Univ. (USSR). Kafedra Ekonomicheskoi Geografii.
For primary bibliographic entry see Field 3E.
W74-10378

MANAGEMENT OF URBAN STORM RUNOFF,
Water Resources Engineers, Walnut Creek, Calif., and Hydrologic Engineering Center, Davis, Calif.
For primary bibliographic entry see Field 5D.
W74-10395

A MODEL FOR EVALUATING RUNOFF-QUALITY IN METROPOLITAN MASTER PLANNING,
Water Resources Engineers, Walnut Creek, Calif.; Hydrologic Engineering Center, Davis, Calif.; San Francisco City and County Dept. of Public Works, Calif.
For primary bibliographic entry see Field 5D.
W74-10396

SYSTEMATIC DEVELOPMENT OF METHODOLOGIES IN PLANNING URBAN WATER RESOURCES FOR MEDIUM SIZE COMMUNITIES: ECONOMIC AND ENVIRONMENTAL IMPACTS OF SURFACE RUNOFF DISPOSAL SYSTEMS,
Purdue Univ., Lafayette, Ind. Dept. of Agricultural Economics.
For primary bibliographic entry see Field 6A.
W74-10397

PLANNING AND WASTEWATER MANAGEMENT OF A COMBINED SEWER SYSTEM IN SAN FRANCISCO,
Colorado State Univ., Fort Collins. Dept. of Civil Engineering.
For primary bibliographic entry see Field 5D.
W74-10413

THE MARKET STRUCTURE OF THE SOUTHERN CALIFORNIA WATER INDUSTRY,
Copley International Corp., La Jolla, Calif.
For primary bibliographic entry see Field 6B.
W74-10414

OPTIMIZATION TECHNIQUES FOR MINIMIZATION OF COMBINED SEWER OVERFLOW,
Dept. of Civil Engineering. Colorado State Univ., Fort Collins.
For primary bibliographic entry see Field 5D.
W74-10415

HYDROLOGIC ASPECTS OF URBANIZATION (GIDROLOGICHESKIYE ASPEKTY URBANIZATSII),
Gosudarstvennyi Gidrologicheskii Institut, Leningrad (USSR).
For primary bibliographic entry see Field 4C.
W74-10631

COUNTY WATER SYSTEM SOLVES DRY AREA PROBLEMS,
Salt Lake County Water Conservancy District, Utah.
For primary bibliographic entry see Field 6D.
W74-10894

3E. Conservation In Industry

PROBLEMS OF WATER SUPPLY OF AN INDUSTRIAL TOWN NEAR A WATERSHED (PROBLEMY VODOSNABZHENIYA PRIVODORAZDEL'NOGO PROMYSHLENNOGO GORODA),
Moscow State Univ. (USSR). Kafedra Ekonomicheskoi Geografii.
N. P. Fedortsov.
Vestnik Moskovskogo Universiteta, Seriya V, Geografiya, No 2, p 112-114, March-April 1974. 2 tab, 3 ref.

Descriptors: *Water supply, *Water utilization, *Industrial water, *Cities, *Human population, Water users, Water demand, Water sources, Artesian wells, Groundwater, Watersheds(Basins), Costs.
Identifiers: *USSR(Mordovian ASSR), *Saransk.

The main source of water supply of the town of Saransk in the Mordovian ASSR is groundwater, which occurs in limited amounts. Water consumption by the two major water users in the town--industry and the population--has almost tripled in the last 10 years. Industrial water supply is based on use of groundwater from artesian wells in industrial areas and from the municipal system. In 1971 daily industrial use of water was more than 80% of all water consumed in the town. In 1971 average daily water use per person was 90 liters and, along with public and domestic use, it was 135 liters. By 1975 total water consumption will be 60% greater than in 1971. Measures aimed at rational use of water resources and maximum curtailment of water losses and delivery costs for satisfying the water demands of the population and industry of Saransk include: (1) complete and accurate accountability of water use; (2) centralization of all water withdrawals into a single municipal water-supply system; (3) introduction of a separate water supply for industry, with limitation and subsequent discontinuation of the use of potable groundwater for industrial needs; (4) construction of storage reservoirs within the environs of the town; and (5) more rapid construction of water-treatment facilities. (Josefson-USGS)
W74-10378

THE MARKET STRUCTURE OF THE SOUTHERN CALIFORNIA WATER INDUSTRY,
Copley International Corp., La Jolla, Calif.
For primary bibliographic entry see Field 6B.
W74-10414

AN ION-EXCHANGE PROCESS FOR RECOVERY OF CHROMATE FROM PIGMENT MANUFACTURING,
Mineral Pigments Corp., Beltsville, Md.
For primary bibliographic entry see Field 5D.
W74-10423

STATE OF MARYLAND WASTE OIL RECOVERY AND REUSE PROGRAM,
Environmental Quality Systems, Inc., Rockville, Md.
For primary bibliographic entry see Field 5D.
W74-10539

ANAEROBIC - AEROBIC PONDS FOR BEET SUGAR WASTE TREATMENT,
Beet Sugar Development Foundation, Fort Collins, Colo.
For primary bibliographic entry see Field 5D.
W74-10542

TREATMENT AND RECOVERY OF FLUORIDE INDUSTRIAL WASTES,
Grumman Aerospace Corp., Bethpage, N.Y.
For primary bibliographic entry see Field 5D.
W74-10543

IMPROVEMENT OF TREATMENT OF FOOD INDUSTRY WASTE,
RAI Research Corp., Long Island City, N.Y.
For primary bibliographic entry see Field 5D.
W74-10544

WASTEWATER ABATEMENT IN CANNING VEGETABLES BY IQB BLANCHING,
Wisconsin Univ., Madison. Dept. of Food Science.
For primary bibliographic entry see Field 5D.
W74-10545

MISSOURI RIVER HYDROLOGY (STREAMFLOW AND TEMPERATURE)--SIOUX CITY, IOWA TO RULO, NEBRASKA,
Battelle-Pacific Northwest Lab., Richland, Wash.
For primary bibliographic entry see Field 2E.
W74-10659

THE EPA RESEARCH AND DEVELOPMENT PROGRAM FOR ENVIRONMENTAL CONTROLS IN THE POWER INDUSTRY,
Environmental Protection Agency, Washington, D.C. Industrial Pollution Control Section.
For primary bibliographic entry see Field 5G.
W74-10781

SOME ENVIRONMENTAL CONSIDERATIONS IN POWER GENERATION,
Burns and Roe, Inc., Oradell, N.J.
For primary bibliographic entry see Field 5G.
W74-10782

ENERGY SHORTAGE STIMULATES GEOTHERMAL EXPLORATION,
Geosystems Corp., N.Y.
For primary bibliographic entry see Field 4B.
W74-10851

3F. Conservation In Agriculture

WHEAT ROOT ROTS ON UNIRRIGATED LANDS IN UZBEKISTAN, (IN RUSSIAN),
Tashkent Univ. (USSR).
L. E. Gol'dshtein, and G. K. Baigulova.
Mikol Fitopatol. Vol 6 No 6, p 524-528. 1972.
Identifiers: *Fungi, Root rots, Soil moisture, Sprouts, Unirrigated lands, *USSR(Uzbekistan), *Wheat root rod, Crop yield.

Wheat root rot is most severe on unirrigated lands in Uzbekistan (USSR) in fall wheat sowings during the period between sowing and mass sprouting. The development of rot is promoted by an insufficient quantity of soil moisture, by precipitation stimulating the development of the sprouts, and by a prolonged stay of the seeds in the soil. Seven species of fungi were found to cause wheat root rot in unirrigated soil.--Copyright 1973, Biological Abstracts, Inc.
W74-10391

QUALITATIVE FEATURES OF HUMUS IN IRRIGATED CHESTNUT (GREYISH-BROWN) SOILS OF THE KARABAKH STEPPE, (IN RUSSIAN),
N. N. Kasimova, and M. P. Babaev.
Izv Akad Nauk Az Ssr Ser Biol Nauk. 2 p 54-57, 1972, Illus.
Identifiers: *Humus, Irrigated soils, *Soils(Chestnut), Steepes, *USSR(Karabakh Steppe).

Soils irrigated for a long time in the Karabakh steppe showed an accumulation of organic matter, and a high content of humic acids. The composition of the humus in soils where irrigation was recently started was nearly identical with that of virgin soils.--Copyright 1973, Biological Abstracts, Inc.
W74-10425

EROSION CONTROL SAVES SOIL NUTRIENTS,
For primary bibliographic entry see Field 4D.
W74-10456

INCOME DISTRIBUTIONAL CONSEQUENCES OF PUBLICLY PROVIDED IRRIGATION: THE COLUMBIA BASIN PROJECT,
Washington State Univ., Pullman. Dept. of Agricultural Economic.
C. L. Infanger.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-234 330, $11.25 in paper copy, $2.25 in microfiche. PhD dissertation, 1974. 150 p, 3 fig, 19 tab, 83 ref. OWRR A-060-WASH(1).

Descriptors: Welfare(Econmics), *Income distribution, Economic evaluation, Decision making, Project planning, Irrigation, *Benefits, Cost-benefits analysis, *Columbia River.

It is conventional to base economic evaluation of water resource projects upon determination of economic efficiency. Income redistribution is an important popular objective of such programs. This study contributes to the development of appropriate procedures and information sources necessary to investigate redistributional effects and target efficiency of publicly provided irrigation projects. One of the important forms of public intervention in the U. S. market system is income opportunities programs such as publicly provided irrigation. The distributional consequences of the Columbia Basin Project are examined. When considering all participants, the top 5 percent of the beneficiaries received 30 percent of total benefits while the bottom 25 percent received 1.2 percent. This comparison of the benefit and burden distributions by income class revealed that the redistributional pattern is clearly not in favor of the poor. The distributional consequences of Columbia Basin Project have been found to be unfavorable. This confirms the evaluations of other income opportunities programs--those who benefit are those most capable of realizing the opportunity but least in need of income enhancement. Publicly provided irrigation may be a popular public sector program but fails to reduce the striking inequality of incomes in American Society.
W74-10524

ADJUSTABLE WATER LEVEL AND EROSION CONTROL DEVICE,
H. J. Soileau.
U S Patent No 3,803,851, 4 p, 4 fig, 11 ref; Official Gazette of the United States Patent Office, Vol 921, No 3, p 925, April 16, 1974.

Descriptors: *Patents, *Irrigation water, *Drainage, *Conservation, *Water levels, Levees, Equipment, Water utilization, Erosion control.

A device controls the level of levee entrapped irrigation water in a given field or area, and it functions in transferring and emptying the water for complete drainage into an adjacent ditch or low level area provided on the other side of the embankment. The structural arrangement consists of a drainage conduit embodying a horizontal drainage pipeline which is adapted to be embedded in a plane beneath the embankment and has an outlet to the ditch. (Sinha-OEIS)
W74-10589

TOWARD THE STRUCTURE OF A PRODUCTION FUNCTION FOR WHEAT YIELDS WITH DATED INPUTS OF IRRIGATION WATER,
Indian Statistical Inst., New Delhi. Planning Unit.
B. S. Minhas, K. S. Parikh, and T. N. Srinivasan.
Water Resources Research, Vol 10, No 3, p 383-393, June 1974. 6 fig, 4 tab, 16 equ, 27 ref.

Descriptors: *Irrigation water, *Irrigation efficiency, Water utilization, *Crop response, *Soil moisture, Analytical techniques, *Wheat, *Alfalfa, Estimating, Yield equations, Ohio, Optimization, Time, Methodology, Evapotranspiration, Water quantity, Plant growth, Water allocation(Policy), Systems analysis.
Identifiers: Production function, Crop yield, Delhi(India).

To date, the interdependence between the rate of water used by plants and the available stocks of moisture in the soil, the temporal interdependence between water use at different time points, and the consequences of these interdependencies for the relationship between time profiles (as well as quantities) of water used by crop plants and yields generally have not been analyzed in a unified framework. Presented is one such framework for the analysis of optimal use of irrigation water. The mathematical form of a water use function, estimated from experimental data, has been used to compute the time profiles of actual water use for wheat in Delhi (India) and alfalfa in Ohio. The estimated time profiles of consumptive use have been used to determine the relationship between wheat yields and dated inputs of water in Delhi. (Bell-Cornell)
W74-10600

WATER REGIMEN AND NITROGEN AND PHOSPHORUS METABOLISM IN PLANTS AFFECTED BY CHLOROCHOLINECHLORIDE (CCC), (IN RUSSIAN),
Akademiya Nauk SSR, Moscow. Inst. of Plant Physiology.
N. S. Petinov, and N. N. Kharanyan.
S-Kh Biol., Vol 7, No 5, p 678-684, 1972. English summary.
Identifiers: Beans, Chloride compounds, *Chlorocholinechloride, *Metabolism, *Nitrogen, Peas, *Phosphorus, Pines, Wheat, Organic compounds(Chlorides).

Plants (bean, peat, spring wheat and pine seedlings) treated with CCC are less sensitive to moisture. After waterings are stopped the water content in leaves of these plants remain rather high, the saturation deficit is small and the concentration of cell sap is lower as compared with the control plants. The retardant effect results in the increase of the water-holding ability of leaves which is connected with the increased amount of the 'tightly bound' water. With the help of H2O18 it is shown that the most favorable water exchange takes place 6 days after the treatment of plants with CCC. The retardant mainly affects protein and nucleic metabolism, inhibiting the decomposition of protein. CCC weakens the absorption of P but stimulates its transport. During the first 3 days after the treatment great inhibition of phosphorylation is observed.--Copyright 1973, Biological Abstracts, Inc.
W74-10604

PRELIMINARY ESTIMATE OF THE EFFECTS OF IRRIGATED AGRICULTURE ON STREAMFLOW IN THE LAKE BALKHASH BASIN (PREDVARITEL'NAYA OTSENKA VLIYANIYA OROSHAYEMOGO ZEMLEDELIYA NA RECHNOY STOK V BASSEYNE OZ. BALKHASH),
Gosudarstvennyi Gidrologicheskii Institut, Leningrad (USSR).
For primary bibliographic entry see Field 4C.
W74-10633

OVERLAND FLOW AND ITS VARIABILITY UNDER THE EFFECT OF AGRICULTURAL AND FOREST-IMPROVEMENT PRACTICES (SKLONOVYY STOK I YEGO IZMENENIYE POD VLIYANIYEM AGROTEKHNICHESKIKH I LESOMELIORATIVNYKH MEROPRIYATIY),
Gosudarstvennyi Gidrologicheskii Institut, Leningrad (USSR).
For primary bibliographic entry see Field 4A.
W74-10634

REFLECTANT INDUCED MODIFICATION OF SOYBEAN CANOPY RADIATION BALANCE: 1. PRELIMINARY TESTS WITH A KAOLINITE REFLECTANT,
Nebraska Univ., Lincoln. Dept. of Agricultural Climatology.
For primary bibliographic entry see Field 2D.
W74-10668

THE HISTORY OF DRIP IRRIGATION,
California Univ., San Diego.
C. D. Gustafson.
Irrigation Age, Vol 7, No 11, p 4-6, June, 1973. 1 fig.

Descriptors: *Irrigation practices, Surface irrigation, Irrigation, Distribution systems, Irrigation programs, *History.
Identifiers: *Drip irrigation, *Trickle irrigation.

Drip irrigation's history from the first research in Israel to later studies in the United States, Italy, Japan, Australia, and Mexico is reviewed. New methods along with a forecast for the future are outlined. (Skogerboe-Colorado State)
W74-10739

DRIP COUNTRY, U.S.A.,
H. Hutto, Jr.
Irrigation Age, Vol 7, No 11, p 32-25, June, 1973. 34 fig.

Descriptors: *Irrigation practices, *Surface irrigation, Irrigation systems, Application equipment, Distribution systems, Irrigation design.
Identifiers: *Drip irrigation.

A pictorial tour is presented of drip irrigation country, systems, crops, types of emitters, hardware, and techniques peculiar to this type of irrigation. (Skogerboe-Colorado State)
W74-10740

IMPROVED INSTALLATION OF MICROTUBE DRIP IRRIGATION EMITTERS,
Texas A and M Univ., Lubbock. Agricultural Research and Extension Center.
O. Wilke.
Agricultural Engineering, Vol 54, No 5, p 17, May, 1973

Descriptors: *Irrigation, Irrigation practices, Irrigation systems, Surface irrigation, *Tubes.
Identifiers: *Drip irrigation, *Microtubes.

Microtubes as drip irrigation emitters have several distinct advantages -- low cost, good hydraulic characteristics, ease of installation. But if the wall of the microtube is thin, the tube may be pinched partially or totally closed where the tube is inserted into a hole punched in the irrigation lateral pipe. If the microtube is extended from the irrigation pipe, it may be cut by rabbits. As microtube emitter flows are increased, the water stream may travel several feet from the emitter. Foliage may be wetted. As the plastic irrigation pipe twists due to contraction, the stream direction may change, altering the soil area wetted by the emitter. These problems can be eliminated at negligible cost by sliding a short piece of black polyethylene tubing over the outlet end of the microtube. (Skogerboe-Colorado State)
W74-10741

BIG GUNS AND BLACK, WAXY GUMBO,
T. Milligan.
Irrigation Age, Vol 7, No 6, p 26-27, January, 1973. 1 fig.

Descriptors: *Irrigation practices, *Sprinkler irrigation, Crop response, Crop production, *Alfalfa, *Texas.

A farmer and a rancher in the midst of the Blackland heavy clay soil area, near Dallas, Texas, are using supplemental irrigation using big gun sprinklers. The sprinklers deliver 4-1/2 inches of water in 20 hours on 10 acres. Five cuttings of hay were produced in one summer, averaging 1000 bales per cutting. (Skogerboe-Colorado State)
W74-10744

GATED PIPE AND SIPHON TUBES.
Irrigation Age, Vol 7, No 8, p 30-31, 34, March, 1973. 1 fig.

Descriptors: Irrigation practices, *Furrow irrigation, Application equipment, Surface irrigation, Irrigation systems, *Siphons, *Tubes, *Nebraska, *Pipes, Corn(Field).
Identifiers: *Gated pipes.

A comparison is presented of a Nebraska farmer's experience with gated pipe and siphon tubes. The gated pipe saved both water and labor. (Skogerboe-Colorado State)
W74-10745

SPRINKLIGATION SPECIAL.
Irrigation Age, Vol 7, No 6, p 17-19, January, 1973. 2 fig, 1 tab.

Descriptors: *Irrigation, *Irrigation practices, *Sprinkler irrigation, Surface irrigation, Irrigation systems, *Soil types, *Loam, *Sands.

On many soil types, sprinkler irrigation is the only proper choice, e.g. deep sands, sandy loams, fields of complex and undulating topography and soils whose productivity would be permanently impaired by or made costly to restore if leveled for gravity. And, sprinklers open the way to 'spoon' feed water and 'spoon' feed plant nutrients; and often get more production per unit of water and nutrients applied. (Skogerboe-Colorado State)
W74-10746

DRIP IRRIGATION BIG SUCCESS AT BUENA VISTA WINERY.
Irrigation Journal, Vol 22, No 6, p 7-8, November-December, 1972. 3 fig.

Descriptors: *Irrigation practices, *Surface irrigation, Application equipment, Surface irrigation, Irrigation systems, *California.
Identifiers: *Sonoma(Calif), *Drip irrigation, *Wineries.

A large drip irrigation system used at the Buena Vista Vineyards is described. The system seems to be very successful in supplying the needed water and also cuts both water use and cultivation costs. (Skogerboe-Colorado State)
W74-10747

SHOULD I IRRIGATE ONLY EVERY OTHER ROW,
T. Milligan.
Irrigation Age, Vol 7, No 7, p 16-18, March 1973. 1 fig, 2 tab.

Descriptors: *Irrigation practices, *Furrow irrigation, Surface irrigation, Water conservation, Crop response, Crop production, *Nebraska, *Corn(Field).

Tests on irrigating every other furrow have been conducted at the University of Nebraska. The field getting water applied down every furrow was irrigated six times, used 14.9 inches of irrigation water to go with the 11.8 inches of rain during the growing season. That plot made 170 bushels of corn per acre. Where the same every other furrow was irrigated, the same number of times, 10.7 inches of water was applied and 161 bushels were harvested per acre. The every other furrow (alternated) used 10.5 inches of irrigation water and yielded 163 bushels an acre. (Skogerboe-Colorado State)
W74-10748

SOIL AND WATER CONSERVATION RESEARCH: CHALLENGE FOR THE 70'S,
Agricultural Research Service, Beltsville, Md. Soil and Water Conservation Research Div.
J. van Schilfgaarde.
Agricultural Engineering, Vol 53, No 4, p 17, 20, April 1972.

Descriptors: *Conservation, *Soil conservation, *Water conservation, *Research priorities, Nitrates, Phosphates, Drainage, *Agriculture.

Research needed in agriculture during the 1970's is described. Work already done is presented and needed research is outlined. (Skogerboe-Colorado State)
W74-10750

CLASS 'A' PAN AND IRRIGATION SCHEDULING,
T. Milligan.
Irrigation Age, Vol 7, No 10, p 12-17, May, 1973. 5 fig, 2 tab.

Descriptors: Irrigation, Irrigation practices, Irrigation design, Application equipment, Distribution systems, *Scheduling, *Evaporation pans, Methodology.
Identifiers: *Irrigation scheduling.

A method is presented whereby a Class A evaporation pan can be used to help schedule irrigation. The method was developed to be used by non-technical personnel. While this method is not as exotic and complete as those using a computer, it is an economical working aid to the farmers. (Skogerboe-Colorado State)
W74-10751

DRIP IRRIGATION: TEXAS STYLE,
L. New.
Irrigation Age, Vol 7, No 11, p 19-21, 23, June, 1973. 1 fig, 1 tab.

Descriptors: *Irrigation practices, *Surface irrigation, Irrigation systems, Application equipment, Distribution systems, Irrigation design, *Texas, Orchards, Greenhouses, Crops.
Identifiers: *Drip irrigation.

Drip irrigated field tests on West Texas orchards, South Plains greenhouses and Dawson County row crops have recently been initiated. Preliminary results of these tests are most favorable and Texas farmers seem pleased at the prospect of this relatively new form of irrigation. (Skogerboe-Colorado State)
W74-10752

REDUCED TILLAGE FARMING: SAVES WATER AND DOLLARS,
Irrigation Age, Vol 7, No 3, p 12-14, October, 1972. 2 fig.

Descriptors: *Cultivation, *Farm management, Soil management, Conservation, Crop production, *Land management, Crop response, *Planting management, *Soil conservation, Irrigation.
Identifiers: *Tillage(Minimum).

Minimum tillage farming, once thought only useful in dryland areas, is now becoming popular under a wide variety of irrigation systems. The main advantages are: moisture conservation, lower production cost, higher profits, reduced erosion, better seedling survival, improved soil structure, increased land opportunity, wildlife habitat, and lower labor requirements. (Skogerboe-Colorado State)
W74-10753

CENTER PIVOTS ON ALFALFA.
Irrigation Age, Vol 7, No 6, p 28-29, 60-61, January, 1973. 3 fig.

Descriptors: *Irrigation systems, *Sprinkler irrigation, *Surface irrigation, Irrigation practices, Application equipment, *Corn(Field), *Alfalfa, *Oklahoma.
Identifiers: *Center pivots.

Center pivot sprinklers are being used in northwestern Oklahoma to transform sparsely vegetated range land into productive alfalfa and corn fields. The 5,340 acres are divided into 29 circles ranging in size from 160 to 240 acres. The soil types range from deep sand to sandy clay. The wide variation in application rates possible with the sprinkler systems makes them ideally suited for the project. Water for the system is provided by a series of wells. (Skogerboe-Colorado State)
W74-10754

SOLID SET ON PECANS.
Irrigation Age, Vol 7, No 6, p 30-32, January, 1973. 6 fig.

Descriptors: *Irrigation systems, *Sprinkler irrigation, Surface irrigation, Irrigation practices, Application equipment, Supplemental irrigation, *Pecans.
Identifiers: *Solid set sprinkler systems.

A buried solid set sprinkler system is being used on a large pecan orchard. The Buckner sprinkler heads used are 1/8-inch, low trajectory with an angle of 20 degrees so as to keep the water under the trees as much as possible. Low foliage on the trees is kept pruned off to facilitate a more even water pattern and uniform wetting of the area around the tree. Eighteen sprinklers take care of an acre, and each acre has 36 trees. The manually operated system on phase one will cover the 1,027 acres in 12 days. Each set is for 24 hours. Water is supplied from river pumps which pump into a 300,000 gallon reservoir. Two turbine pumps rated at 5,600 gpm push the water from the river through a 22-inch pipeline to the reservoir. Three 8-inch horizontal centrifugal pumps are used to bring water out of the storage tank under a pressure of about 75 pounds. The sprinklers are operated at 55 to 60 pounds psi. (Skogerboe-Colorado State)
W74-10755

UNCONVENTIONAL FURROW IRRIGATION.
Irrigation Age, Vol 7, No 8, p 36-37, March, 1973. 1 fig.

Descriptors: *Irrigation practices, *Furrow irrigation, Automation, Surface irrigation, Application equipment, Irrigation systems, *Texas, *Cotton.
Identifiers: El Paso(Tex).

In recent years, Texas A and M scientists at El Paso developed a variable row spacing system for irrigated cotton that greatly reduced water needs. The system involved the use of 80-inch spaced furrows separated by wide, flat beds. The space between the rows of cotton on each side of the furrow was 26 inches. This system reduced the size of seasonal irrigations from six to three inches per application and lowered total water use by 54 percent compared to 40-inch rows watered in every furrow. (Skogerboe-Colorado State)
W74-10756

AUTOMATIC IRRIGATION SUPPLY SEQUENCING VALVE,
Mauna Kea Sugar Co., Hilo, Hawaii.
J. F. Cykler.
Agricultural Engineering, Vol 53, No 1, p 21, January, 1972. 2 fig.

Descriptors: *Irrigation practices, Surface irrigation, *Sprinkler irrigation, Hydraulic valves, *Automatic control.

A valve is described that improves the man-day performance of irrigation crews handling a number of 1500 gpm automatic overhead irrigators. It is a primary directional flow control for a zone of irrigation where water could be switched to either of two quick-coupled or buried irrigation pipe lines. This valve assembly is self-contained with its own power supply and can be either portable or fixed. The assembly consists of a 6-inch DeZurik 3-way water valve fitted with a handle and a set screw to float the valve plug. The action of the valve, through its 90 degree arc of operation, is accomplished by a 4 inch by 12 inch double-acting hydraulic cylinder fitted with the usual swivel brackets and rod end clevises. The upstream water pressure provides the driving force to power the piston. A 100 mesh line filter prevents trash from plugging the small orifices in the solenoid water valves. (Skogerboe-Colorado State)
W74-10757

AUTOMATED FURROW IRRIGATION,
T. Milligan.
Irrigation Age, Vol 7, No 8, p 24-25, March, 1973. 1 fig.

Descriptors: *Irrigation practices, *Furrow irrigation, *Automation, Surface irrigation, Application equipment., Irrigation systems, *Valves.

Automation of the gated pipe system was made possible by an 18-inch air actuated valve. The valve connects to a riser on a buried pipeline or a tee in an above-ground supply line. Gated pipe is connected to the valve to distribute the water down the furrows. The valve may be six or eight inches in diameter, depending on the size of the gated pipe. The nylon-reinforced butyl rubber diaphragm is inflated to stop the water flow through the valve. The valve will fully close when one psi pressure more than the pressure in the supply pipeline is applied. For instance if the water pressure in the mainline is three psi, four psi air pressure from the compressor was needed to completely shut off the water. It is estimated that a full quarter-section of land can be equipped for automated furrow irrigation for about the same money it takes to equip a quarter section with center-pivot sprinkler...$16,000 to $20,000. (Skogerboe-Colorado State)
W74-10759

EFFECT OF SOIL MOISTURE DURING EARLY STAGES OF DEVELOPMENT ON GROWTH AND YIELD OF COTTON PLANTS,
Hebrew Univ., Rehovot (Israel). Faculty of Agriculture.
A. Marani, and D. Levi.
Agronomy Journal, Vol 65, No 4, p 637-641, July-August, 1973. 7 fig, 2 tab, 11 ref.

Descriptors: *Irrigation, *Irrigation practices, *Cotton, Crop response, *Soil moisture, Crop production, Tension.
Identifiers: *Israel.

The effect of three irrigation treatments on the vegetative development of two cultivars of upland cotton was studied in two experiments conducted under different climatic conditions. The treatments differed until the middle of flowering and were designated as L (no irrigation), M (regular), and H (early and excessive irrigation). From mid-flowering onwards all plots were irrigated regularly. In both experiments, treatment L resulted in a slower growth rate, smaller plants, fewer nodes and fruiting branches, and smaller leaf area index (LAI) and dry matter (DM) weight throughout the season. Small differences were found between the effects of treatments M and H. No excessive vegetation development was observed in this study. The highest rates of DM production were associated with LAI values between 2.0 and 3.0. A close relationship was found between lint yield, DM production and leaf area duration. (Skogerboe-Colorado State)
W74-10761

SURFACE RUNOFF LOSSES OF SOLUBLE NITROGEN AND PHOSPHORUS UNDER TWO SYSTEMS OF SOIL MANAGEMENT,
Cornell Univ., Ithaca, N.Y. Dept. of Agronomy.
For primary bibliographic entry see Field 5B.
W74-10789

ON THE MECHANISM OF WATER-STRESS-INDUCED STEM DEFORMATION,
Auburn Univ., Ala.
F. J. Molz, and B. Klepper.
Agron J. Vol 65 No 2 p 304-306. 1973. Illus.
Identifiers: *Cotton, Gossypium-Hirsutum, *Stem deformation(Plants), *Moisture stress, Xylem.

Experiments were performed to determine where and to what extent stem deformation occurs in the tissue of water-stressed cotton (Gossypium hirsutum L.) plants. Such knowledge is necessary if stem contraction is ever to be used as an index of plant water status. Tension in the xylem of cotton stems was released by severing under water, and portions of stem xylem were subjected to positive hydrostatic pressures in a pressure chamber. The results indicate that the mature xylem of a cotton stem is a rigid material that undergoes negligible elastic deformation in the radial direction when subjected to a hydrostatic stress in the vicinity of 10-15 bars. Any measurable deformation in a water-stressed stem is due almost entirely to dehydration of the living cells found in the phloem and related tissues. These conclusions indicate that it will not be possible to develop a simple relationship between stem diameter changes and plant water status such that a measurement of stem shrinkage can be used to estimate xylem water potential directly. The relationship is complicated by the thickness and water relations of the outer living stem cells.--Copyright 1973, Biological Abstracts, Inc.
W74-10796

ESTIMATING TRANSPIRATION RESISTANCE,
Kansas State Univ., Manhattan. Dept. of Agronomy.
For primary bibliographic entry see Field 2D.
W74-10806

MEASUREMENT OF LEAF WATER POTENTIAL IN WHEAT WITH A PRESSURE CHAMBER,
Agricultural Research Service, Mandan, N. Dak. Northern Great Plains Research Center.
A. B. Frank, and D. G. Harris.
Agron J. Vol 65, No 2, p 334-335. 1973. Illus
Identifiers: *Leaf-water potential, Measurement, *Pressure chambers, Triticum-Aestivum, *Wheat, *Growth rates, Leaves.

Estimates of leaf water potential obtained with a pressure chamber and with thermocouple psychrometers were compared for wheat (Triticum aestivum L.) leaves of late tillering and early heading stages of growth. The methods were linearly related for both stages of growth, but the equations were different. The pressure chamber required a separate calibration for estimating water potential of leaves from 2 locations on wheat plants.--Copyright 1973, Biological Abstracts, Inc.
W74-10811

LAND DRAINAGE OF REDDISH CLAY LOAMS,
Wisconsin Univ., Madison.
L. R. Massie, and G. H. Tenpas.
Paper No 72-728 presented at Winter Meeting of the American Society of Agricultural Engineers, December 11-15, 1972, Chicago, Illinois. 8 p, 1 fig, 5 tab.

Descriptors: *Drainage, Surface drainage, Subsurface drainage, Tile drainage, Crop response, Soil water, Drainage engineering, Soil water movement, *Loam, *Forages, *Clays, Fertilization, *Wisconsin.

An excellent forage crop can be established and maintained on the reddish clay soils in Northern Wisconsin under the following conditions: A drainage system (surface and/or tile) is installed on the field. Soil acidity and fertility levels are maintained in the acceptable range for legumes. Variety selection is used to overcome any situations where complete water control cannot be achieved. The old idea of a rotation is abandoned with the legume being plowed down only to balance the small grain and forage acreages. (Skogerboe-Colorado State)
W74-10879

COMPARISON OF DRAINAGE METHODS IN A HEAVY-TEXTURED SOIL,
Ohio Agricultural Research and Development Center, Wooster.
G. O. Schwab, N. R. Fausey, and D. W. Michener.
Paper No 72-727 presented at Winter Meeting of the American Society of Agricultural Engineers, December 11-15, 1972, Chicago, Illinois. 5 p, 1 tab, 6 ref.

Descriptors: *Drainage, Surface drainage, Subsurface drainage, Tile drainage, Crop response, Soil water, Drainage engineering, Soil water movement.

Corn, oat, and soybean yields from surface drained, tile drained, and a combination of tiled and surface drained plots in northern Ohio were obtained over a 10-year period. Both conventional tillage and no tillage practices were included. Rainfall plus irrigation and drainage flow effects on yields were studied by linear regression techniques. (Skogerboe-Colorado State)
W74-10881

TEMPERATURE AND MOISTURE EFFECTS ON HARDENING OF APPLE ROOTS,
North Central Forest Experiment Station, Grand Rapids, Minn.
D. K. Wildung, C. J. Weiser, and H. M. Pellett.
Hortscience. Vol 8, No 1, p 53-55, 1973. Illus.
Identifiers: *Apple roots, Malus-robusta, Moisture, Rainfall, Season, *Root hydration, Root systems, *Soil temperature, Root hardening.

Roots of 'Malling (M) 26' and 'Malus robusta (MR) 5' were less hardy than stems in winter; hardened more slowly in fall; and dehardened later in spring. In 1967 roots were hardier than in 1968, despite slightly higher soil temperatures. This difference in hardiness was associated with much less rainfall in 1967 leading to a lower level of root hydration. While overall soil temperature-hardiness relationships were unclear, short-term changes in root hardiness were correlated with soil temperature during the preceding week. Hardening in apple roots appeared to be influenced by soil temperature and level of root hydration.Copyright 1973, Biological Abstracts, Inc.
W74-10882

THE AGRICULTURAL USE OF BLACKBURN SEWAGE SLUDGE,
Blackburn County Board Corp. (England).
For primary bibliographic entry see Field 5D.
W74-10895

4. WATER QUANTITY MANAGEMENT AND CONTROL

4A. Control Of Water On The Surface

WATER RESOURCES INVESTIGATIONS IN ARIZONA, 1973.
Geological Survey, Washington, D.C.
For primary bibliographic entry see Field 7C.
W74-10362

PROBLEMS OF WATER SUPPLY OF AN INDUSTRIAL TOWN NEAR A WATERSHED (PROBLEMY VODOSNABZHENIYA PRIVODORAZDEL'NOGO PROMYSHLENNOGO GORODA),
Moscow State Univ. (USSR). Kafedra Ekonomicheskoi Geografii.
For primary bibliographic entry see Field 3E.
W74-10378

INTERPRETATION OF LAND USE AND STREAM ORDER, PAWNEE RIVER BASIN, KANSAS.
Kansas Univ. Center for Research, Inc., Lawrence.
Available from NTIS, Springfield, Va. 22161 as N73-31310, Price $3.00 printed copy; $2.25 microfiche. ERTS Detailed Image Interpretation Report No 2264-8, September 1973. 3 p, 2 fig, 1 ref. NASA Contract NAS-5-21822.

Descriptors: *Remote sensing, *Land use, *Drainage patterns(Geologic), *Kansas, Crops, Geomorphology, Farms, Data collections, Grasslands, Water resources, Mapping.
Identifiers: *Pawnee River basin(Kans).

Land use and stream orders were mapped from ERTS-1 imagery covering the Pawnee River Basin. Total area of the basin, irrigated and dry land crop area, and rangeland area were determined. The stream order of the basin was calculated by the Strahler method and provided more detail than is available on the comparable 1:250,000 sheets. ERTS-1 are useful for mapping and mensuration of data relating to permanence of ground cover types and the extent of irrigation. (Knapp-USGS)
W74-10430

A RESERVOIR MODEL ALTERNATIVE TO THE UNIT HYDROGRAPH FOR FLOOD ESTIMATION,
Transport and Road Research Lab., Crowthorne (England).
D. Fiddes.
Available from NTIS, Springfield, Va 22161 as PB-222 047, Price $3.75 printed copy; $2.25 microfiche. Report LR 554, 1973. 33 p, 5 fig, 1 plate, 7 tab, 11 ref, 1 append.

Descriptors: *Rainfall-runoff relationships, *Storm runoff, *Storage, *Unit hydrographs, Computer programs, Mathematical models, *Africa, Water storage, Infiltration, Overland flow, Urban hydrology, Urban runoff.
Identifiers: Kenya, Uganda, Nairobi.

A simple nonlinear reservoir catchment model is described and compared to the unit hydrograph. Both models are calibrated using data from a Kenyan catchment. The new model requires less data for calibration and is capable of more accurate flood prediction. A network of representative catchments was instrumented throughout Kenya and Uganda to provide the necessary data for developing improved flood design methods for road engineers in East Africa. None of the catchments within the rural network has yet provided sufficient data to calibrate the model but records from the Bernhard catchment which is a catchment installed at an earlier data for a similar investigation into urban flooding in Nairobi, Kenya were used. Although within an urban area, this catchment behaves in many respects in a similar way to a rural catchment. (Knapp-USGS)
W74-10432

CHANNEL NETWORK SIMULATIONS,
IBM Watson Research Center, Yorktown Heights, N.Y.
J. S. Smart.
Available from NTIS, Springfield, Va 22161 as AD-775 248, Price $3.00 printed copy; $2.25 microfiche. Final Contract Report, February 1974. 9 p, 11 ref. Contract ONR N00014-70-C-0188.

Descriptors: *Simulation analysis, *Drainage patterns(Geologic), Stochastic processes, Hortons law, *Drainage density, Geologic control, Tributaries, Geomorphology, Topography, Mathematical models, *Channel morphology.

Random-walk models were developed to simulate drainage development. A new model was devised in which the probability of headward growth depended on the amount of undissected area immediately upslope from the stream tip. The input parameters can be identified with geologic and climatic properties. The model rests on three specific postulates: in the absence of geological controls, channel networks are topologically random; for drainage basins developed under similar environmental conditions, the exterior and interior link lengths are independent random variables with a single common distribution for each type; and the Melton parameter K (ratio of square of mean link length to mean drainage area) is unity. (Knapp-USGS)
W74-10443

WATERHEAD FORECAST POSSIBILITIES ON HYDRAULIC BASIS,
M. Kozak.
Acta Technica Academiae Scientiarum Hungaricae, Vol 75, No 1-4, p 219-233, 1973. 4 fig, 4 tab, 21 ref.

Descriptors: *Mathematical models, *Rivers, Hydraulics, *Water levels, *River forecasting, *Forecasting, Water management(Applied).

Forecasting the water level of rivers in an important water management activity. General solution of the problem may be arrived at by discussing it on a deterministic basis. Economic solution of the differential equation system describing the phenomenon was made feasible by digital calculation engineering. The implicit method, combined with an iteration process, is employed for forecasting. (Murphy-FIRL)
W74-10453

PRITTLE BROOK DIVERSION TUNNEL,
For primary bibliographic entry see Field 8A.
W74-10482

MISSOURI RIVER BASIN COMMISSION, ANNUAL REPORT FOR FY ENDING JUNE 30, 1972.
Water Resources Council, Washington, D.C.
For primary bibliographic entry see Field 6E.
W74-10511

NEW ENGLAND RIVER BASINS COMMISSION 1973 ANNUAL REPORT.
New England River Basins Commission, Boston, Mass.
For primary bibliographic entry see Field 6E.
W74-10512

HARRY S. TRUMAN DAM AND RESERVOIR, OSAGE RIVER, MISSOURI, APPENDIX C, (FINAL ENVIRONMENTAL STATEMENT).
Army Engineers District, Kansas City, Mo.
Available from Nat Tech Info Serv, Springfield, Va 22161, as EIS-MO-73-0340-F-2, $18.25 in paper copy, $2.25 in microfiche. February 1973. 324 p, 118 tab, 36 map, 5 chart.

Descriptors: *Missouri, *Environmental effects, *Reservoirs, Dams, *Surface waters, *Flooding(Intentional inundation), Backwater, Water control, Dam construction, Flood control, Water utilization, Water supply, Water storage, Fisheries, Groundwater recharge, Flood damage, Electric power, Dikes, Recreation.
Identifiers: *Environmental Impact Statements, *Osage River(Mo).

The purpose of this project is to construct a dam and reservoir at Warsaw, Missouri, for flood control, hydroelectric power, and recreation. This study includes an evaluation of the environmental impact on the biotic, physical, cultural, recreational, and socioeconomic characteristics in the surrounding area primarily affected by the reservoir. As a result of the reservoir, large deposits of natural resources will be permanently inundated, making mining operations more difficult and more costly. Some of the natural scenic beauty along the Osage River will be concealed by the reservoir waters. The reservoir will increase the potential for significant land developments associated with leisure and recreational activities, but the inundation will cause a reduction in agricultural lands. The reservoir will also raise groundwater levels in the area and will serve to recharge groundwater aquifers, while the surface water acreage will be significantly increased. Wildlife habitat will decrease but fisheries will be greater in size. Alternatives included not building the dam, developing wildlife areas or hatcheries, and construction of retaining walls or dikes. (Conko-Florida)
W74-10523

DISTRIBUTIONAL CONSEQUENCES OF RECREATION PROVISION IN WATER RESOURCE PROJECTS--THE POTHOLES RESERVOIR,
Washington State Univ., Pullman. Dept. of Agricultural Economics.
For primary bibliographic entry see Field 6B.
W74-10550

EFFECT OF DRAIN DEPTH AND GAP WIDTH ON POTENTIAL FLOW IN HOMOGENEOUS POROUS SOIL,
Waikato Univ., Hamilton (New Zealand). Dept. of Mathematics.
P. C. Cheeseman, R. J. Hosking, and A. D. Sneyd.
Journal of Hydrology, Vol 21, No 3, p 219-229, 1974. 5 fig, 1 tab, 8 ref.

Descriptors: *Potential flow, *Drainage, Soils, Porous media, Numerical analysis, Soil water movement, Theoretical analysis, Impervious soils, *Drains, *Saturated soils.
Identifiers: Flux ratio, New Zealand, Netherlands.

The solution of a problem in potential theory is presented in determining the effect of drain depth and gap width on potential flow in homogeneous porous soil. To control water saturation in soils, it is common to control the water drainage. A two dimensional situation involving a drain is discussed. Seepage flow from an equipotential surface into drains of half width gamma at relative depth is considered to represent the flow through a porous soil either normal to impervious layers with intervening gaps or perhaps to a single row of drain pipes. The equipotential surface may be the soil surface with perhaps ponded water above it, or it may be the level of the water table. An exact solution for the flux ratio, suitable for numerical computation, is found by Schwarz-Christoffel conformal transformation. An asymptotic expression derived for the flux ratio is found to be accurate except for quite small relative depth. (Merritt-FIRL)
W74-10568

FUNCTIONING PROCESS OF DRAINAGE IN HYDROMORPHIC WASHED SOIL (SUR LE PROCESSUS DE FONCTIONNEMENT DES DRAINS EN SOL LESSIVE HYDROMORPHE),
Institut National de la Recherche Agronomique, Dijon (France). Station d'Agronomie.
S. Meriaux.
Annales Agronomiques, Vol 24, No 6, p 639-650, 1973. 6 fig, 2 tab, 10 ref. English summary.

Descriptors: *Soil water movement, *Chlorine, *Drainage, Soil water, Soil structure, Soil profiles.
Identifiers: France, *Soil layers.

Chlorine marking was used to study the mechanism of water movement during drainage in washed soil. The chlorine never goes below a level of 40 cm. It is eliminated by drainage in an essentially lateral movement taking place before remoistening of the lower layers. The lower layers are moistened by pre-existing water in the upper layers of soil by vertical movement independent of drainage. The functioning of drainage in deep beds, as was shown, raises a problem of duration of effectiveness. (Merritt-FIRL)
W74-10570

VALIDITY OF THE MODIFIED BILHAM EQUATION,
West Riding County Council, Yorkshire (England). Highways and Bridges Dept.
For primary bibliographic entry see Field 2B.
W74-10572

OPTIMAL CONTROL OF MULTIUNIT INTER-BASIN WATER RESOURCE SYSTEMS,
Tokyo Inst. of Tech. (Japan). Dept. of Civil Engineering.
K. Takeuchi, and D. H. Moreau.
Water Resources Research, Vol 10, No 3, p 407-414, June 1974. 6 fig, 2 tab, 28 ref.

Descriptors: *Multiple-purpose projects, *River basin development, *Reservoir operation, *Linear programming, *Dynamic programming, Stochastic processes, Algorithms, Simulation analysis, Equations, Optimization, Economic efficiency, Reservoir storage, Reservoir releases, Inflow, Streamflow, Methodology, Decision making, North Carolina, Mathematical models, Systems analysis.
Identifiers: *Multi-reservoir operation, Economic loss, Storage levels.

A method is presented for finding optimal operating policies for a multi-reservoir water resource system that extends over two river basins and serves multiple demands. The method has been developed and tested for one of several water resource systems proposed for further development in the urbanizing Piedmont Triad region of North Carolina. Monthly operating decisions are given by solutions of a piecewise linear programming problem; the objective function consists of two parts: immediate economic losses within the month and the expected present value of future losses as a function of end-of-month storage levels in the reservoirs. The latter function is estimated by imbedding the linear programming problem in a stochastic dynamic programming problem. An approximate solution technique for the larger problem is described, and computational experience is reported. The approximate solution technique involves the use of simulation in a recursive algorithm. Simulation is used also to test the derived policy on the 40 years of actual streamflow data that exist in the case study area. (Bell-Cornell)
W74-10603

THE ANALYSIS OF SOME MONTHLY HYDROLOGIC TIME SERIES,
Idrutecneco, San Lorenzo in Campo (Italy).
For primary bibliographic entry see Field 2A.
W74-10606

METHODS OF EVALUATING THE EFFECT OF A COMPLEX OF HUMAN FACTORS ON WATER RESOURCES AND WATER REGIME OF WATERSHEDS (O METODAKH OTSENKI VLIYANIYA KOMPLEKSA FAKTOROV KHOZYAYSTVENNOY DEYATEL'NOSTI NA VODNYYE RESURSY I VODNYY REZHIM VODOSBOROV),
Gosudarstvennyi Gidrologicheskii Institut, Leningrad (USSR).
For primary bibliographic entry see Field 4C.
W74-10627

IRRETRIEVABLE RUNOFF LOSSES OF THE VOLGA RIVER THROUGH EVAPORATION FROM RESERVOIRS OF THE VOLGA-KAMA CASCADE (BEZVOZVRATNYYE POTERI STOKA R. VOLGI ZA SCHET ISPARENIYA S VODOKHRANILISHCH VOLZHSKO-KAMSKOGO KASKADA),
Gosudarstvennyi Gidrologicheskii Institut, Leningrad (USSR).
I. A. Shiklomanov, and G. M. Veretennikova.
In: Voprosy vliyaniya khozyaystvennoy deyatel'nosti na vodnyye resursy i vodnyy rezhim; Gosudarstvennyy Gidrologicheskiy Institut Trudy, No 206, p 22-51, Leningrad, 1973. 3 fig, 8 tab, 10 ref.

Descriptors: *Runoff, *Water loss, *Evaporation, *Reservoirs, *Human population, Water balance, Volume, Seasonal, Equations.
Identifiers: *USSR, *Volga River, *Kama River(USSR).

Runoff of the Volga is presently regulated by a system of 9 major reservoirs constructed at varying periods on the Volga and Kama Rivers and comprising a single Volga-Kama cascade. Data are given on total volume of runoff losses for the cascade of reservoirs and for each major reservoir separately by year for 1941-69. Maximum runoff losses for a year and a warm season occurred in 1966 and amounted to 4.4 cu km and 6.5 cu km, respectively. During winter, reservoirs of the cascade increase runoff of the Volga by a maximum of 2.0-2.1 cu km (1966, 1967, 1968), which is approximately 3% of winter runoff during these years. Tabulated results of calculations for 1959-69 can be used to estimate runoff variability of the Volga under the effect of man at the present time and in the future and to restore runoff at different gaging stations. According to these calculations, the depth of runoff losses for a year and a warm season has a distinct zonal character and varies between 50 mm and 300 mm for reservoirs in the north and between 300 mm and 470 mm for reservoirs located in the zone of inadequate moisture. Maximum depth of runoff losses occurs at the southernmost (Volgograd) reservoir and is 370 mm for a year and 464 for a warm season. For a winter period, the depth of runoff losses for the reservoirs varies insignificantly and is 150 mm for reservoirs in the north and about 100 mm for reservoirs in the south. (See also W74-10626) (Josefson-USGS)
W74-10628

CALCULATION OF GROUNDWATER RECHARGE AND EVALUATION OF THE EFFECT OF LAND- AND FOREST-IMPROVEMENT PRACTICES (RASCHET PITANIYA GRUNTOVYKH VOD I OTSENKA VLLYANIYA NA NEGO AGROLESOMELIORATIVNYKH MEROPRIYATIY),
Gosudarstvennyii Gidrologicheskii Institut, Leningrad (USSR).
For primary bibliographic entry see Field 4C.
W74-10629

EVALUATION OF THE EFFECT OF HUMAN ACTIVITY ON RUNOFF OF LARGE RIVERS IN THE CAUCASUS (KURA, TEREK, KUBAN') (OTSENKA VLIYANIYA KHOZYAYSTVENNOY DEYATEL'NOSTI NA STOK KRUPNYKH REK KAVKAZA (KURA, TEREK, KUBAN')),
Gosudarstvennyi Gidrologicheskii Institut, Leningrad (USSR).
For primary bibliographic entry see Field 4C.
W74-10630

OVERLAND FLOW AND ITS VARIABILITY UNDER THE EFFECT OF AGRICULTURAL AND FOREST-IMPROVEMENT PRACTICES (SKLONOVYY STOK I YEGO IZMENENIYE POD VLIYANIYEM AGROTEKHNICHESKIKH I LESOMELIORATIVNYKH MEROPRIYATIY),
Gosudarstvennyi Gidrologicheskii Institut, Leningrad (USSR).
V. Ye. Vodogretskiy, E. A. Zaytseva, and L. V. Yefimova.
In: Voprosy vliyaniya khozyaystvennoy deyatel'nosti na vodnyye resursy i vodnyy rezhim; Gosudarstvennyy Gidrologicheskiy Institut Trudy, No 206, p 172-207, Leningrad, 1973. 7 fig, 13 tab, 15 ref.

Descriptors: *Overland flow, *Slopes, *Runoff, *Agricultural engineering, *Forest management, Forests, Shelterbelts, Grasslands, Cultivated lands, Soil types, Soil moisture, Runoff coefficients, Freezing, Snow cover, Seasonal, Variability, Correlation analysis, Regression analysis, Curves, Equations.
Identifiers: *USSR.

Procedures are developed for estimating the effect of agricultural practices on overland flow, based on analysis of the relation of the runoff coefficient to soil moisture, soil freezing, and slope gradients. These procedures can be used to estimate the effect of agricultural practices by considering differences in soils and slope gradients for forested and forested-steppe zones of European Russia and the steppe zone of Northern Kazakhstan. Reduction in mean annual runoff on plowed slopes is substantial in forested-steppe and steppe zones. For slopes with gradients greater than 20%, reduction in runoff is 15% and 35%, respectively, and for small gradients (<20%) it is 30% and 40%. In the wet forested zone reduction in runoff does not exceed 5-10%; for small gradients it reaches 15-25%. To calculate possible reduction in runoff from forested slopes and slopes intersected by shelterbelts, formulas are given which take into account the effects of a slope gradient and the extent of forests covered by shelterbelts. The effect of a forest is considerable; with slope gradients of 0 to 150%, reduction in runoff is 100-50%. The effect of shelterbelts on reduction of overland flow is even more significant if the shelterbelts are located at right angles to the slope. (See also W74-10626) (Josefson-USGS)
W74-10634

FLOOD HAZARD ANALYSES, BONNER BRANCH OF THE PECATONICA RIVER, BELMONT, WISCONSIN.
Soil Conservation Service, Madison, Wis.
For primary bibliographic entry see Field 2E.
W74-10635

HYDROLOGIC DATA FOR NORTH CREEK TRINITY RIVER BASIN TEXAS, 1972,
Geological Survey, Austin Tex.
For primary bibliographic entry see Field 7C.
W74-10640

PHOTO-HYDROLOGICAL RECONNAISSANCE SURVEYS,
International Inst. for Aerial Survey and Earth Sciences, Enschede (Netherlands).
For primary bibliographic entry see Field 7B.
W74-10648

DRAINAGE OF LEVEL OR NEARLY LEVEL ROADS,
Transport and Road Research Lab., Crowthorne (England). Structural Properties Div.
For primary bibliographic entry see Field 4C.
W74-10660

AN ESTIMATE OF LEAKAGE FROM BLACKFOOT RESERVOIR TO BEAR RIVER BASIN, SOUTHEASTERN IDAHO,
Geological Survey, Tacoma, Wash.
N. P. Dion.
Idaho Department of Water Administration Boise Water Information Bulletin No 34, February 1974. 24 p, 7 fig, 1 tab, 23 ref. $0.50 per copy.

Descriptors: *Reservoir leakage, *Idaho, *Surface-groundwater relationships, Water loss, Seepage, Basalts, Aquifers, Water balance, Hydrologic budget, Permeability.
Identifiers: *Blackfoot reservoir(Ida), *Bear River basin(Ida).

Water is leaking out of the Blackfoot reservoir in Idaho (Snake River drainage) into the Soda Creek basin (Bear River drainage). The basalt of the Blackfoot Lava Field varies locally from a very productive aquifer to only a fair aquifer. Yields are 200 to 3,500 gallons per minute and specific capacities 3 to 3,500 gpm per foot of drawdown. Numerous carbonated springs occur in the headwaters and along the course of Soda Creek, and extensive deposits of tufa occur in the Soda Creek drainage. It is probable that the tufa has affected the permeability of the basalt, at least locally where the springs now discharge or have discharged in the past. Modified hydrologic-budget analyses compare actual and expected yields of subbasins. The amount of leakage from the Blackfoot River basin is about 10 cubic feet per second. The excess yield of Soda Creek is about 52 cfs. The excess yield between gaging stations on Bear River upstream and downstream from the mouth of Soda Creek is 49 cfs. Much of the difference between the estimated leakage from Blackfoot Reservoir and the water yield of Soda Creek and Bear River is the contribution of the numerous carbonated springs in the region. Raising the stage of the reservoir 9 feet, as proposed, would increase both the hydraulic gradient of the groundwater south of Blackfoot Reservoir and leakage from the reservoir to Soda Creek basin by about 60%. (Knapp-USGS)
W74-10661

SIMPLE METHOD FOR PREDICTING DISPERSION IN STREAMS,
Geological Survey, Bay Saint Louis, Miss.
For primary bibliographic entry see Field 5B.
W74-10676

RANGELAND HYDROLOGY,
Geological Survey, Denver, Colo.
F. A. Branson, G. F. Gifford, and J. R. Owen.
Society for Range Management, Denver, Colorado, Range Science Series No 1, October 1972. 84 p, 27 fig, 13 tab, 274 ref.

Descriptors: *Grasslands, *Hydrology, *Water yield, *Erosion, *Range management, Water balance, Arid lands, Water management(Applied), Water quality, Groundwater, Evapotranspiration, Precipitation(Atmospheric), Interception, Infiltration, Runoff, Sedimentation, Geomorphology.
Identifiers: *Rangeland hydrology.

Rangeland hydrology, or rangeland watershed management, is the study of hydrologic principles as applied to range ecosystems. Although rangelands encompass many different climatic zones, this booklet deals chiefly with rangeland hydrology in arid and semiarid regions. Of the approximately 40% of the world's land surface that is classified as rangeland, over 80% is within arid and semiarid zones. Generally, these lands are characterized by extremes in the various components of the hydrologic cycle, examples being low rainfall, high evapotranspiration potential, and low water yield. Intermittent streams common on arid and semiarid rangelands have different characteristics than do permanent streams of more humid areas, and the time required to obtain statistically reliable results from rangeland studies may be long because of the low frequency of runoff events, relatively small runoff quantities, and highly variable precipitation. The major concerns of rangeland hydrology may be divided into four categories: (1) runoff or water yields from watersheds, (2) erosion and sedimentation, (3) quality of water, and (4) occurrence of groundwater. (Knapp-USGS)
W74-10682

FLOOD PLAIN INFORMATION--PETERS CREEK, BIRCHWOOD, ALASKA,
Corps of Engineers, Anchorage, Alaska.
Army Corps of Engineers Flood Plain Report, May 1974. 12 fig, 14 plate, 2 tab.

Descriptors: *Floods, *Alaska, *Flood plains, Flood control, Flood protection, *Data collections, Flood plain zoning, Hydrologic data.
Identifiers: Birchwood(Alaska), Peter Creek(Alas).

A portion of the community of Birchwood, Alaska, is subject to flooding from Peters Creek. The properties along this stream are primarily residential and were moderately damaged by the flood of August 1971. The open spaces in the flood plains which are now under pressure for future development are extensive. A history of flooding along Peters Creek identifies those areas that are subject to possible future floods. Special emphasis is given to these floods through maps, photographs, profiles, and cross sections. A suitable basis is given for the adoption of land use controls to guide flood plain development. Other flood damage reduction techniques such as works to modify flooding and adjustments, including flood profiling, might be embodied in an overall flood plain management program. (Knapp-USGS)
W74-10684

SURFACE WATER SYSTEM -- 1973,
Wyoming Univ., Laramie. Water Resources Research Inst.
For primary bibliographic entry see Field 7C.
W74-10695

PRACTICES IN DETENTION OF URBAN STORMWATER RUNOFF,
Poertner (Herbert G.), Bolingbrook, Ill.
H. G. Poertner.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-234 554, $5.75 in paper copy, $2.25 in microfiche. Special Report No. 43, American Public Works Association, Chicago, Illinois, 1974. 231 p, 61 fig, 42 tab, 140 ref, 8 append. OWRR C-3380(No 3722)(1).

Descriptors: *Storage, *Urban runoff, *Detention reservoirs, *Flow rates, *Urban drainage, *Pondage, Drainage systems, Flood control, Overland flow, Flood routing, Design standards, Hydraulics, Reservoir storage, Groundwater recharge, Impounded waters, Runoff, *Storm runoff, Surface runoff, Sewers, Storm drains, Urbanization, Urban hydrology, Water pollution control, Erosion control, Silting, Infiltration, *Storm water.
Identifiers: *On-site stormwater detention.

On-site detention of runoff was investigated as an alternative to other methods of urban stormwater runoff management. It was found that this method, which involves collecting excess runoff before it enters the sewer system, can often be applied as an effective and economical means of reducing peak runoff flow rates to lessen or eliminate problems of flooding, pollution, soil ero-

sion and siltation. The captured runoff sometimes can be used to augment water supplies for potable or non-potable uses, and the detention facilities can be designed to serve multiple-purpose uses, especially recreation. The use of on-site detention facilities has been given emphasis in those urban areas where flooding is a frequent problem. A 1972 survey of selected local jurisdictions in urban areas of the United States and Canada revealed that more than 1,400 facilities were operational in about 100 local jurisdictions reporting applications. Because only about 500 jurisdictions were contacted, the actual number of such facilities in existence is thought to be many times more. Most of the representatives of the 230 public agencies and 40 engineering firms that responded to the survey questionnaire consider on-site detention of runoff in urban areas to be a useful stormwater management method that is worthy of study and implementation. Many applications of the method were identified in which substantial cost savings over a conventional urban stormwater drainage system had been realized by incorporating on-site detention of runoff into the system. The use of on-site detention facilities in managing runoff in urban communities can be expected to increase as the techniques and benefits become more widely known.
W74-10696

PUBLIC WORKS FOR WATER AND POWEER DEVELOPMENT AND ATOMIC ENERGY COMMISSION APPROPRIATION BILL, 1975, PART I, PART II.
For primary bibliographic entry see Field 6E.
W74-10697

WATER BANK ACT.
Committee on Merchant Marine and Fisheries (U. S. House).
For primary bibliographic entry see Field 6E.
W74-10705

PERIODICITY OF WOOD FORMATION IN SOME TREES OF LOWLAND RAINFOREST IN NIGERIA,
Nigeria Univ., Nsukka. Dept. of Botany.
For primary bibliographic entry see Field 2I.
W74-10730

PLAYING TO WIN IN THE DRAINAGE GAME,
For primary bibliographic entry see Field 6E.
W74-10733

(DEATH OF A POND. DEATH OF A RIVER. THE SOUND AND FURY).
For primary bibliographic entry see Field 5G.
W74-10735

SCHEDULING IRRIGATIONS WITH HIGH-SPEED DATA FROM A COMPUTER,
T. Milligan.
Irrigation Age, Vol 7, No 10, p 4, 10, 11, May, 1973.

Descriptors: *Irrigation, *Scheduling, Irrigation practices, Irrigation systems, *Idaho, Data processing.
Identifiers: *Irrigation scheduling.

A commercial irrigation scheduling firm in Idaho is described. The firm utilizes a program developed by Marvin Jensen at the Kimberly Research Center. The system feeds basic information related to a crop's water use, time of peak water use and other pertinent data to a computer to determine the optimum irrigation schedule. (Skogerboe-Colorado State)
W74-10743

SOIL AND WATER CONSERVATION RESEARCH: CHALLENGE FOR THE 70'S,
Agricultural Research Service, Beltsville, Md. Soil and Water Conservation Research Div.
For primary bibliographic entry see Field 3F.
W74-10750

RELATIONSHIPS BETWEEN SOIL SALINITY AND THE SALINITY OF APPLIED WATER IN THE SUISUN MARSH OF CALIFORNIA,
California State Dept. of Fish and Game, Sacramento.
G. L. Rollins.
Calif Fish Game. Vol 59, No 1, p 5-35. 1973.
Identifiers: *California(Suisun Marsh), Flooding, Leaching, *Marshes, *Salinity, *Soil salinity, Waterfowl food plants, Water management(Applied).

Investigations were conducted on 4 private duck clubs under typical water management practices and in a test pond where water management and surface water salinities were controlled. A significant correlation existed between the salinity of applied water and the salinity in the first and second ft of soil. The flooding of marsh soils with highly saline water, under present marsh management practices, would greatly increase existing soil salinities. The leaching of marsh soils by alternate flooding and draining with low salinity water was an effective means of reducing soil salinity. The type of water management practiced by the duck clubs studied produces extremely high soil salinities which inhibit the production of valuable waterfowl food plants. Leaching is recommended as general practice in Suisun Marsh (California) to reduce soil salinity and enhance the production of the more important waterfowl food plants.--Copyright 1973, Biological Abstracts, Inc.
W74-10764

HYDROGEOLOGY FIELD TRIP, EAST BAY AREA AND NORTHERN SANTA CLARA VALLEY,
Stanford Univ., Calif.
For primary bibliographic entry see Field 2F.
W74-10850

LAND DRAINAGE OF REDDISH CLAY LOAMS,
Wisconsin Univ., Madison.
For primary bibliographic entry see Field 3F.
W74-10879

COMPARISON OF DRAINAGE METHODS IN A HEAVY-TEXTURED SOIL,
Ohio Agricultural Research and Development Center, Wooster.
For primary bibliographic entry see Field 3F.
W74-10881

CHEMICAL METHOD OF PREVENTING LOSS OF INDUSTRIAL AND FRESH WATERS FROM PONDS, LAKES AND CANALS,
Dow Chemical Co., Tulsa, Okla. Dowell Div.
R. B. Rosene, and C. F. Parks.
Water Resources Bulletin, Vol 9, No 4, p 717-722, August, 1973. 2 fig, 5 ref.

Descriptors: *Seepage, *Seepage control, *Sealants, Polymers, Water loss, Groundwater, Impervious membranes, Leakage, Linings, Reservoir leakage, Soil sealants.

Preventing or markedly reducing the loss of aqueous fluids from a variety of reservoirs is becoming increasingly important. Fear of pollution from industrial waters and sewage impoundments as well as the economic factors involved in loss of fresh water add impact to this problem. The seriousness of the problem is reviewed and methods that have been used to reduce loss of fluid are discussed. New materials for control of water loss are constantly being advocated, and chemical research has provided new systems that work extremely well. These systems, which combine unique chemicals and novel methods of application, are described. Specific case histories are included. (Skogerboe-Colorado State)
W74-10883

PROGRESS IN THE RURAL WATER PROGRAMS OF LATIN AMERICA,
Pan American Health Organization, Washington, D.C.
For primary bibliographic entry see Field 6B.
W74-10887

COUNTY WATER SYSTEM SOLVES DRY AREA PROBLEMS,
Salt Lake County Water Conservancy District, Utah.
For primary bibliographic entry see Field 6D.
W74-10894

4B. Groundwater Management

A GROUNDWATER QUALITY MODEL: A HYBRID COMPUTER SIMULATION,
California Univ., Los Angeles. School of Engineering and Applied Science.
For primary bibliographic entry see Field 5B.
W74-10352

WATER RESOURCES INVESTIGATIONS IN ARIZONA, 1973.
Geological Survey, Washington, D.C.
For primary bibliographic entry see Field 7C.
W74-10362

ANALOG MODEL STUDY OF THE GROUNDWATER BASIN OF THE UPPER COACHELLA VALLEY, CALIFORNIA,
Geological Survey, Washington, D.C.
S. J. Tyley.
Available from Sup Doc., GPO, Washington, D.C. 20402, price $1.05. Water-Supply Paper 2027, 1974. 77 p, 35 fig, 15 tab, 52 ref.

Descriptors: *Analog models, *California, *Groundwater basins, Groundwater movement, Water levels, Water yield, Water quality, Artificial recharge, Withdrawal, Hydrogeology.
Identifiers: *Coachella Valley(Calif).

An analog model of the groundwater basin of the upper Coachella Valley, California was constructed to determine the effects of imported water on groundwater levels. Groundwater levels generated by the model approximated the historical change in water levels for the period 1936-67. The groundwater basin was almost unaffected by man's activities until about 1945 when groundwater development caused the water levels to begin to decline. The Palm Springs area has had the largest water-level decline, 75 feet since 1936, because of large pumpage, reduced natural inflow from the San Gorgonio Pass area, and diversions of natural inflows at Snow and Falls Creeks and Chino Canyon starting in 1945. The most logical area to recharge the Colorado River water is the Windy Point-Whitewater area, where adequate percolation rates of 2-4 acre-feet per acre per day are probable. The Whitewater River bed may be the best location to spread the water if the largest part of the imported water can be recharged during low-flow periods. Projected pumpage for the period 1968-2000 was programmed on the model with the proposed recharge of Colorado River water for the same period. The model indicated a maximum water-level increase of 200 feet above the 1967 water level at Windy Point, the proposed recharge site, by the year 2000, a 130-foot increase by 1990, and a 20-foot increase by 1980. The model indicated that the proposed quantities of recharge

will beneficially affect the groundwater system to Palm Desert by 1980, to Point Happy by 1990, and possibly to the Coachella Canal by 2000. The model indicated that the upper and lower valleys are within the same hydrologic system. (Knapp-USGS)
W74-10363

GEOLOGY AND HYDROLOGY OF RICE COUNTY, CENTRAL KANSAS,
Geological Survey, Lawrence, Kans.
C. K. Bayne, and J. R. Ward.
Bulletin 206, Part 3, April 1974. 17 p, 12 fig, 1 tab, 12 ref.

Descriptors: *Hydrogeology, *Water resources, *Kansas, Aquifers, Hydrologic data, Water wells, Water yield.
Identifiers: *Rice County(Kans).

The principal aquifer in Rice County, Kansas is in the Pleistocene fluvial deposits where yields to irrigation wells of 1,000 gpm are common and, locally, yields may be as much as 2,000 gpm. Sandstone aquifers in the Kiowa and Dakota Formations commonly yield an adequate supply of water for domestic and stock wells, and may yield as much as 150 gpm. The water in the Pleistocene deposits is a calcium bicarbonate type and is very hard. Water in the sandstone also is a calcium bicarbonate type where the overlying Pleistocene aquifer is in hydraulic connection. If an appreciable thickness of shale separates the aquifers, the water in the sandstone may be a sodium bicarbonate type. Highly mineralized water from formations below the Kiowa may occur at shallow depths as a result of local contamination by oilfield brines or industrial wastes. (Knapp-USGS)
W74-10408

ESSENTIALS OF GROUND-WATER HYDROLOGY PERTINENT TO WATER-RESOURCES PLANNING,
Water Resources Council, Washington, D.C. Hydrology Committee.
For primary bibliographic entry see Field 2F.
W74-10410

WATER-TABLE CONTOUR MAP, ANCHORAGE AREA, ALASKA,
Geological Survey, Anchorage, Alaska.
For primary bibliographic entry see Field 7C.
W74-10436

INFORMATION STORAGE AND RETRIEVAL SYSTEM FOR WELL HYDROGRAPH DATA USER'S MANUAL,
Battelle-Pacific Northwest Lab., Richland, Wash. Water and Land Resources Dept.
D. R. Friedrichs.
Available from NTIS, Springfield, Va 22161 as BNWL-1705, Price $5.45 printed copy; $2.25 microfiche. Report BNWL-1705 (UC-70), 1972. 48 p, 9 fig, 3 tab, 1 ref, 5 append. USAEC Contract AT(45-1)-2130.

Descriptors: *Computer programs, *Hydrographs, *Water level fluctuations, *Water wells, *Data processing, *Data storage and retrieval, Groundwater.
Identifiers: Well hydrographs.

Programs used in storage and retrieval of well hydrograph data are described and listed. The programs are used on either a UNIVAC 1108 computer or a PDP-9 computer, depending upon their function. The UNIVAC 1108 computer programs are transmitted from the PDP-9 to the 1108 via a data communication link for execution. The computations are returned to the PDP-9 via the data link and manipulated by the PDP-9 computer programs to provide the required output options. Preparatory functions are performed before the execution of the main PDP-9 computer program DSWELL, which is the actual data retrieval and display program. The functions of each of the programs is described in detail. (Knapp-USGS)
W74-10442

COST OF DEVELOPING GROUND WATER IN THE PAT HARRISON WATERWAY DISTRICT, MISSISSIPPI,
University of Hattiesburg, Southern Missippi. Bureau of Business Research.
D. J. Etzold, D. C. Williams, Jr., and Modena Guice.
Available from the National Technical Technical Information Service, Springfield, Va 22161 as PB-234 433, $3.25 in paper copy, $2.25 in microfiche. Mississippi Water Resources Research Insitute Mississippi State, Completion Report, July 1974. 30 p, 18 tab, 5 ref. OWRR A-069-MISS(1).

Descriptors: *Costs, Economics, *Alternative water use, Planning, *Mississippi, *Water uses, *Water districts, *Groundwater, Aquifers, Water utilization, Water wells, *Cost analysis, *Operating costs, Maintenance costs.

The purpose was to estimate the cost of water from aquifers in the Pat Harrison Waterway District. In meeting this objective, other information for use in planning and managing water resources in the District was obtained including water use per capita. Major cities, smaller municipalities and rural water systems in the District were selected for study. The wells in operation were drilled at different times. Thus, present costs of such wells were estimated and amortized over a 20 year period to provide a common time base for cost analysis. Annual operation and maintenance costs were examined. Thus, fixed and variable costs were included as separate components. The costs were converted to the cost per 1,000 gallons. Although the costs varied by system, there were similarities. The gallons of water produced per capita and per metered customer were significantly higher for the cities than for the smaller systems.
W74-10530

AN EVALUATION OF SUBSURFACE TECHNIQUES FOR AQUIFER PREDICTION IN COMPLEX SEDIMENTARY SYSTEMS,
Mississippi State Univ., State College. Dept. of Geology and Geography.
For primary bibliographic entry see Field 2F.
W74-10533

MANAGEMENT AND ADMINISTRATION OF GROUND WATER IN INTERSTATE AQUIFERS, PHASE II,
Bittinger (M. W.) and Associates, Inc., Fort Collins, Colo.
M. W. Bittinger, E. B. Jones, and W. H. Fischer.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-234 432, $7.25 in paper copy, $2.25 in microfiche. Completion Report, June 1974, 300 p, 23 fig, 17 tab. OWRR C-3072 (No 3681)(1).

Descriptors: *Groundwater, *Aquifers, *Interstate, *Water law, *Water management(Applied), *Administration, Prior appropriation, Common law, Legal aspects, *Interstate compacts, Legislation.

Case studies of six interstate aquifer situations are presented. Case-study areas were selected so as to achieve a range in physical, legal, and socio-economic conditions. The States and the aquifers involved in the interstate aquifer case studies are as follows: Virginia-North Carolina (Coastal Plain Aquifer); Vermont-New Hampshire-Massachusetts-Connecticut (Connecticut River Quaternary Aquifer System); Illinois-Wisconsin (Cambrian-Ordovician Aquifer); Wyoming-Nebraska (North Platte River Alluvium); Texas-New Mexico (Ogallala Formation); Washington-Idaho (Spokane River Valley-Rathdrum Prairie Aquifer System). The case study of each situation involved a review of pertinent literature plus interviews with many Federal, Regional, State, and local authorities. The legal analysis explores the alternatives open to individuals and State legislatures in resolving interstate ground-water conflicts.
W74-10537

APPLICATION OF GROUNDWATER HYDRAULICS TO A BASALTIC WATER-TABLE AQUIFER,
Central Groundwater Board, Nagpur (India).
P. G. Adyalkar, and V. V. S. Mani.
Journal of Hydrology, Vol 21, No 3, p 211-218, 1974. 2 fig, 3 tab, 10 ref.

Descriptors: *Aquifers, *Basalts, Groundwater, Hydraulics, *Water table, Hydrogeology, *Pumping, Analytical techniques, Analysis, *Water wells, *Testing procedures.
Identifiers: India, Thiem's formula, Narasimhan's ratio method.

An analysis of pump test data of open wells in a basaltic water table aquifer was made with methods based on both equilibrium and non-equilibrium formulae. The study has indicated that the Thiem's equilibrium formula and the ratio method of Narasimhan appear to be more suitable as compared with Jacob's and Chow's methods. Of the two, Narasimhan's ratio method, which does not require the graphical procedure, is more reliable than the Thiem's method since the latter involves an assumption of the value for the radius of influence. From the value of T (coefficient of transmissibility) obtained by Narasimhan's method, it is also possible to calculate the value of the radius of influence by Thiem's method, which can be used in determining the required spacing between wells in the basaltic terrain in order to avoid mutual interference. (Merritt-FIRL)
W74-10569

TRITIUM WATER TRACING,
Atomic Energy Research Establishment, Harwell (England).
For primary bibliographic entry see Field 5B.
W74-10615

APPLICATION OF GEOPHYSICAL METHODS IN THE INVESTIGATION OF MINERAL AND THERMAL WATERS,
Institute for Geological and Geophysical Research, Belgrade (Yugoslavia).
B. Milonovic.
Available from NTIS, Springfield, Va. 22161 as TT-72-56033, Price $3.00 printed copy; $2.25 microfiche. Technical Translation TT 72-56033, NOLIT Publishing House, Belgrade, Yugoslavia, 1973. 8 p, 4 fig.

Descriptors: *Geophysics, *Thermal water, *Mineral water, *Exploration, *Subsurface investigations, Borehole geophysics, Seismic studies, Temperature, Electrical studies, Resistivity.
Identifiers: *Yugoslavia.

In the investigation of mineral and thermal waters geophysical methods may be applied for solution of structural geological problems and evaluation of the hydrogeological properties of rocks and the mineralization of subterranean waters. Temperature anomalies on the surface indicate the subterranean flow paths of thermal waters. These data help to elucidate the geological structure of the terrain and its hydrogeology and enable choice of the most favorable locations for boring. Electric resistivity plotting is the geophysical method most frequently used in investigation of groundwaters in general. Seismic reflection methods can also be used for solution of structural geological problems. (Knapp-USGS)
W74-10645

WATER AVAILABILITY IN CENTRAL WISCONSIN - AN AREA OF NEAR-SURFACE CRYSTALLINE ROCK,
Geological Survey, Washington, D.C.
E. A. Bell, and M. G. Sherrill.
Available from Superintendent of Documents GPO, Washington, D.C. 20402, Price $4.25 (paper cover). Water-Supply Paper 2022, 1974. 32 p, 9 fig, 6 tab, 43 ref.

Descriptors: *Water resources, *Wisconsin, *Groundwater, *Surface waters, Glacial drift, Alluvium, Aquifers, Hydrogeology, Induced infiltration, Water quality, Surface-groundwater relationships.

Available groundwater in much of central Wisconsin is limited to discharge through wells of low yield. Aquifers that yield small amounts of water to wells include fractured crystalline rock at or near surface in the eastern part of the area, sandstone overlying crystalline rock in the southern and western parts, and glacial till. Outwash sand and gravel in segments of some bedrock channels, however, yield large supplies of water to wells. Wells in surficial sand and gravel in the lower valleys of major tributaries to the Wisconsin River yield as much as 450 gpm. Sand and gravel in segments of bedrock channels are covered by till or alluvium; wells in these sand and gravel deposits yield 100-400 gpm. Induced recharge to buried aquifers by infiltration of water through the beds of overlying streams is feasible at six sites within 8 miles of Marshfield. Infiltration through the streambed of Little Eau River about 7 miles northeast of Marshfield was about 200 gpm when the groundwater level was lowered temporarily. Additional recharge through ponding is possible at other sites. Streamflows in the area generally are not dependable sources of municipal or industrial supplies without storage. Chemical quality of water in the area is suitable for most uses. Groundwater is hard, contains objectionable concentrations of iron, and locally is high in nitrate content. Surface water has an average dissolved-solids content of about 100 mg/l. (Knapp-USGS)
W74-10647

AN EXPERIMENTAL MEASUREMENT OF IN SITU STRESS IN GRANITE BY HYDRAULIC FRACTURING,
Los Alamos Scientific Lab., N. Mex.
For primary bibliographic entry see Field 8E.
W74-10663

THE STRANGE WORLD OF MISCIBLE DISPLACEMENT,
Louisiana State Univ., Baton Rouge. Dept. of Civil Engineering.
For primary bibliographic entry see Field 5B.
W74-10664

HYDROLOGY OF LAKE TARPON NEAR TARPON SPRINGS, FLORIDA,
Geological Survey, Tallahassee, Fla.
For primary bibliographic entry see Field 2H.
W74-10673

OGALLALA AQUIFER WATER-LEVEL DATA, WITH INTERPRETATION, 1965-1974,
High Plains Underground Water Conservation District No. 1, Lubbock, Tex.
F. Rayner.
June 1974. 81 p, 15 fig, 18 ref.

Descriptors: *Water levels, *Observation wells, *Texas, *Basic data collections, Groundwater, Water table, Water districts.
Identifiers: *Ogallala aquifer(Tex), *High Plains(Tex).

Water levels in the Ogallala aquifer of the High Plains Underground Water Conservation District No. 1 measured from 1955-1971 in the observation well program are tabulated. An analysis of the historical and current trends of the changes in water levels and an analytical discussion on rates on rates of aquifer dipletion are presented. The current observation well network in the District consists of 835 wells. (Knapp-USGS)
W74-10685

AUTHORIZING THE SECRETARY OF THE INTERIOR TO CONSTRUCT, OPERATE, AND MAINTAIN THE CLOSED BASIN DIVISION OF THE SAN LUIS VALLEY PROJECT, COLORADO.
Committee on Interior and Insular Affairs (U.S. Senate).
For primary bibliographic entry see Field 6E.
W74-10706

SANITARY LANDFILL LEACHATE INTERACTIONS WITH A CARBONATE-ROCK DERIVED SOIL IN CENTRAL PENNSYLVANIA,
Pennsylvania State Univ., University Park. Dept. of Geology and Geophysics.
For primary bibliographic entry see Field 5B.
W74-10827

RESISTIVITY METHODS IN PROSPECTING FOR GROUND WATER,
Kansas State Univ., Manhattan. Dept. of Geology.
D. W. Steeples.
M Sc Thesis, 1970. 48 p, 7 fig, 3 tab, 27 ref, append.

Descriptors: *Groundwater recharge, Alluvium, Erosion, Bedrock, Electrodes, Electrical resistivity, Transmissivity, *Hydrologic properties, *Kansas.
Identifiers: *Electrode spacing intervals, *Wenner electrode configuration, *Direct current earth resistivity, *Groundwater exploration.

As part of groundwater recharge studies, a method of groundwater exploration was developed. Resistivity is better suited to application in conjunction with a limited but well-planned test-drilling program. The resistivity survey in this investigation was performed with portable direct current equipment in a four-square-mile area just east of Manhattan, Kansas. The Wenner electrode configuration ultimately became the basis for the field work. The method developed can be recommended for use in areas where alluvium covers bedrock. The method should not be used by itself without test drilling or some other independent method of exploration. (Staplin-NWWA)
W74-10832

UNDERGROUND STORAGE OF NATURAL GAS IN ILLINOIS-1973,
Geological Survey, Urbana, Ill.
For primary bibliographic entry see Field 8E.
W74-10834

APPLICATIONS OF INHOLE GEOPHYSICAL LOGS IN VOLCANIC ROCKS, NEVADA TEST SITE,
Geological Survey, Denver, Colo.
For primary bibliographic entry see Field 8G.
W74-10846

ENERGY SHORTAGE STIMULATES GEOTHERMAL EXPLORATION,
Geosystems Corp., N.Y.
R. L. Fuchs, and W. H. Westphal.
World Oil, Vol 177, No 7, p 37-41, December, 1973. 3 tab.

Descriptors: *Geothermal studies, Energy, Electric power production, Drilling, *Industries, Geochemistry, Geysers, Hot springs, Steam, Subsurface water, Thermal water.
Identifiers: *Energy shortage, Energy reserves, *Geothermal exploration, Geothermal history, Geothermal Steam Act of 1970.

Extensive exploration programs now are underway in the western United States to evaluate potential of geothermal energy. A variety of companies are involved in the effort, including many gas and oil producers. Advantages of geothermal energy as a power source can be demonstrated, and these account for its increasing stature in the energy picture. Environmental impact of electrical power generation using geothermal energy is well below that of other power systems, even though noise, noxious gases and waste water may have to be contended with in the field. Geothermal impact on future U.S. energy requirements is theoretically very large, but in a commercial and practical sense, largely unknown. Until the search is made, extent and value of U.S. geothermal energy resources remain vague. Nevertheless, even though precluded from exploring the major part of the potential lands, private industry has moved ahead dramatically in the geothermal field, spurred by competitive and economic incentives arising out of the energy crisis. Steady growth in exploration and in the development of new geothermal fields is forecast. (Martino-NWWA)
W74-10851

SURFACE TO SUBSURFACE CORRELATION OF COLUMBIA RIVER BASALT USING GEOPHYSICAL DATA IN PARTS OF ADAMS AND FRANKLIN COUNTIES, WASHINGTON,
Washington State Univ., Pullman. Dept. of Civil Engineering.
B. A. Siems.
College of Engineering Bulletin 331, 1973. 65 p, 20 fig, 23 ref, append.

Descriptors: *Borehole geophysics, *Subsurface mapping, Logging, Radioactive well logging, Columbia River, *Surface-groundwater relationships, *Washington, *Basalts.
Identifiers: Gamma log, Neutron-epithermal log, *Columbia River Basalt.

Stratigraphic work in the Columbia River Basalt has utilized differences in outcrop and petrographic characteristics. However, the northeastern part of the plateau has limited outcrop, and seems well-suited for an attempt to extend surface mapping into the subsurface using geophysical logs of deep wells. Emphasis has been placed on the natural gamma and neutron-epithermal neutron logs. The neutron-epithermal log has been found to be valuable for locating flow contacts. Two marker features were recognized on the gamma logs: a gradual increase in natural radioactivity with depth in the upper 150-250 feet of the Frenchman Springs Member, and a marked high gamma spike at the probable stratigraphic position of the Quincy Diatomite. Correlations using these features, the known geology, and the TiO2 analyses, suggest the existence of 530 feet of Frenchman Springs Basalt in one well. This is about 130 feet less than is recognized on well logs from two coreholes in the Hanford Reservation and 40 feet more than exists near the mouth of Devils Canyon, south of Kahlotus. Natural gamma correlations also indicate an increase in southerly dip just north of Cunningham, possibly the continuation of the Frenchman Hill anticline to the west. (Staplin-NWWA)
W74-10858

HOW GEOTHERMAL WELLS ARE DRILLED AND COMPLETED,
Big Chief Drilling Co., Oklahoma City, Okla.
For primary bibliographic entry see Field 8A.
W74-10860

REPORT ON THE LAMBOURN VALLEY PILOT SCHEME, 1967-1969,
Thames Conservancy, Reading (England).
E. J. Brettel.

1971. 170 p, 65 fig, 24 tab, 21 ref.

Descriptors: *Groundwater resources, Water resources development, *Surface water availability, *Surface-groundwater relationships, *Feasibility studies.
Identifiers: *Thames River(UK), *Lambourn Valley Pilot Scheme(UK), Thames Catchment, Thames Conservancy.

Results are presented of an investigation into the feasibility of a proposal to develop groundwater resources for the purpose of augmenting stream flow whenever necessary, and thus to increase the surface water resources of the Thames Catchment. The Lambourn Catchment is described, and the three-year program of test pumping. The results of the general hydrological studies are summarized and applied to the analysis of the observations made during the pumping tests. The Conservators' proposals are shown to be feasible, and general conclusions are drawn concerning the planning of their Groundwater Scheme. The results show that groundwater resources in the chalk and the limestone of the Thames Catchment can be developed to augment stream flow by 100 mgd. It is proposed that this development take place in five stages, beginning as soon as possible and to be completed by 1981. (Staplin-NWWA)
W74-10862

CONTROL OF UNCONSOLIDATED SANDS IN WASTE-DISPOSAL WELLS,
Subsurface Disposal Corp., Houston, Tex.
For primary bibliographic entry see Field 8A.
W74-10868

DEEP DISPOSAL SYSTEMS FOR RADIOACTIVE WASTES,
Office of Environmental Affairs (AEC), Washington, D.C.
For primary bibliographic entry see Field 5B.
W74-10869

THE OCCURRENCE OF WATER IN THE PRECAMBRIAN CRYSTALLINE ROCKS OF THE NEW JERSEY HIGHLANDS,
Rutgers. The State Univ., New Brunswick, N.J.
A. D. James.
M Sc Thesis, May, 1967. 74 p, 28 fig, 11 tab, 59 ref.

Descriptors: *Water wells, *Crystalline rocks, *Groundwater, Granites, Igneous rocks, Metamorphic rocks, Porosity, Permeability, Stress, Specific yield, Topography, Drilling, Drill holes, Faulting, *Well data, New Jersey, Precambrian era.
Identifiers: *New Jersey Precambrian Highlands, Well depth, Exploration drilling, Groundwater development.

Well records from approximately 900 wells were obtained from the office of the New Jersey State Geologist at Trenton. The specific capacities and yields per foot of well were computed for each well, and their locations were plotted on maps with a scale of one mile to the inch. Approximately 400 of these wells were replotted more accurately on 7 1/2 minute United States Geological Survey quadrangles. Each well was plotted on the 7 1/2 minute quadrangles primarily by referring to a sketch map which was included in each well record. Road maps, housing development maps and air photos were also referred to in the plotting. Doubtful well locations were field checked. A review is presented of previous work on the occurrence of water in crystalline rocks and with the occurrence of water in the New Jersey Precambrian Highlands. (Staplin-NWWA)
W74-10872

HOW WELLS AFFECT SHALLOW GLACIAL GROUND-WATER SUPPLIES IN SOUTH DAKOTA,
South Dakota State Univ., Brookings. Agricultural Extension Service.
F. F. Kerr, M. J. Tipton, J. W. Grimes, J. E. Powell, and E. F. LeRoux.
(1970). 11 p, 11 fig.

Descriptors: Groundwater management, Groundwater recharge, *Water levels, *Pumping, *Glacial aquifers, *South Dakota.
Identifiers: *Glacial groundwater.

An explanation is provided of how groundwater levels react when water is withdrawn by pumping and how groundwater is being managed. Consideration is given only to the glacial groundwater aquifers, most of which are very shallow. Part I discusses what groundwater is, how it accumulates underground, and the different underground formations in which it is found. Part II discusses the effect of pumping on groundwater supplies. Part III explains the management procedures used in South Dakota to maintain an inventory of groundwater levels so that depletion of these waters may be avoided. (Campbell-NWWA)
W74-10873

4C. Effects On Water Of Man'S Non-Water Activities

MODELING THE TOTAL HYDROLOGIC-SOCIOLOGIC FLOW SYSTEM OF URBAN AREAS,
Utah State Univ., Logan. Inst. for Social Science Research on Natural Resources.
W. H. Andrews, J. P. Riley, C. W. Colton, G. B. Shih, and M. B. Masteller.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-234 318; $4.50 in paper copy, $2.25 in microfiche. Utah Water Research Laboratory, Logan, Report PRWG109-1, April 1973. 108 p, 22 fig, 8 tab, 194 ref, 3 append. OWRR C-3272(3712)(1).

Descriptors: *Urban sociology, *Social impact, *Decision making, *Social change, *Urban hydrology, *Computer models, *Simulation analysis, *Flood control, Social values, Social participation, Social function, Recreational demand, Economic impact, Aesthetics, Water management, Hydrology, Mathematical models, Hydrologic models, Channel improvements, *Utah.
Identifiers: *Salt Lake County(Utah), *Urban flooding, *Salt Lake City(Utah), Wasatch Front, Jordan River(Utah).

The first phase is described of a larger study directed toward the development of a general technique for analyzing and solving urban metropolitan hydrologic problems through consideration of both the physical and social dimensions. This report is limited to the preliminary work of identification of social variables, the first steps in assigning mathematical values to them, and developing a mathematical format for these variables. In addition, the physical-hydrologic system is identified for purposes of clarifying the elements in that system. The ultimate objective of the entire study is directed toward discovering a theoretical and generally applicable mathematical model of both the physical and social dimensions involved in metropolitan flooding problems.
W74-10351

MANAGEMENT OF URBAN STORM RUNOFF,
Water Resources Engineers, Walnut Creek, Calif., and Hydrologic Engineering Center, Davis, Calif.
For primary bibliographic entry see Field 5D.
W74-10395

SYSTEMATIC DEVELOPMENT OF METHODOLOGIES IN PLANNING URBAN WATER RESOURCES FOR MEDIUM SIZE COMMUNITIES: ECONOMIC AND ENVIRONMENTAL IMPACTS OF SURFACE RUNOFF DISPOSAL SYSTEMS,
Purdue Univ., Lafayette, Ind. Dept. of Agricultural Economics.
For primary bibliographic entry see Field 6A.
W74-10397

SNOW ROAD CONSTRUCTION TECHNIQUE BY LAYERED COMPACTION OF SNOW-BLOWER PROCESSED SNOW,
Naval Civil Engineering Lab., Port Hueneme, Calif.
For primary bibliographic entry see Field 8G.
W74-10403

EFFECTS OF ROAD SALT IN WINTER,
Louvain Univ. (Belgium). Public Health Lab.
H. Van de Voorde, M. Nijs, and P. J. Van Dijck.
Environmental Pollution, Vol 5, No 3, p 213-218, 1973. 1 fig, 2 tab, 10 ref.

Descriptors: Rivers, Streams, Roads, *Highway icing, *Snow removal, *Salinity, *Chlorides, Water pollution sources, *Path of pollutants.
Identifiers: *Belgium(Dye River).

The effect of salt treatment of roads in winter was investigated by assaying the salt concentration in three streams and soils over a two year period in Louvain, Belgium. Salt increased the chloride concentration in the Dyle River, which crosses the city, and the Voer River, a rural stream, by nearly 20-30 mgl/liter for only 24 hr. The mean chloride concentration for the rivers is irregular. The fluctuations are due to rainfall diluting the salt. The chloride in the rivers originates principally from domestic sewage which gives fairly constant levels. The amount of the salt deposited on the banks of the roads filters down to the phreatic water locally increased the chloride concentration of the groundwater, but not to a concentration which can be considered harmful to the health of consumers. Other minor disadvantages of road salt are damage to ornamental vegetation and corroding effect on metallic surfaces. The hazards of the use of road salt are negligible compared with traffic safety benefits. (Merritt-FIRL)
W74-10460

PROBLEMS OF THE EFFECT OF HUMAN ACTIVITY ON WATER RESOURCES AND WATER REGIME (VOPROSY VLIYANIYA KHOZYAYSTVENNOY DEYATEL'NOSTI NA VODNYYE RESURSY I VODNYY REZHIM),
Gusudarstvennyi Gidrologicheskii Institut, Leningrad (USSR).
A. I. Chebotarev, and I. A. Shiklomanov.
Gosudarstvennyy Gidrologicheskiy Institut Trudy, No 206, Chebotarev, A. I., and Shiklomanov, I.A., editors, Leningrad, 1973. 212 p.

Descriptors: *Water resources, *Streamflow, *Runoff, *Discharge(Water), *Human population, Urbanization, Urban sociology, Agriculture, Forestry, Watersheds(Basins), Slopes, Overland flow, Water balance, Groundwater recharge, Water utilization, Irrigation, Variability, Statistical methods, Computers, Foreign research.
Identifiers: *USSR.

The effect of man on formation and characteristics of streamflow was investigated in this collection of 8 papers prepared by Leningrad State Hydrologic Institute. Procedural problems of investigations are discussed, and attention is directed to an evaluation of the effects of channel regulation, irrigation, industrial and public water use, urbanization, and of a whole complex of human factors on such hydrologic characteristics of water bodies as annual and seasonal runoff, seasonal distribution of runoff, and peak discharge. (Josefson-USGS)

W74-10626

METHODS OF EVALUATING THE EFFECT OF A COMPLEX OF HUMAN FACTORS ON WATER RESOURCES AND WATER REGIME OF WATERSHEDS (O METODAKH OTSENKI VLIYANIYA KOMPLEKSA FAKTOROV KHOZYAYSTVENNOY DEYATEL'NOSTI NA VODNYYE RESURSY I VODNYY REZHIM VODOSBOROV),
Gosudarstvennyi Gidrologicheskii Institut, Leningrad (USSR).
I. A. Shiklomanov.
In: Voprosy vliyaniya khozyaystvennoy deyatel'nosti na vodnyye resursy i vodnyy rezhim; Gosudarstvennyy Gidrologicheskiy Institut Trudy, No 206, p 3-21, Leningrad, 1973. 1 fig, 47 ref.

Descriptors: *Watershed management, *Watersheds(Basins), *Water resources, *Human population, Runoff, Water balance, Heat balance, Correlation analysis, Regression analysis, Computers, Computer programs, Equations, Evaluation.
Identifiers: *USSR.

Basic types of human activity which have the greatest effect on water resources and water regime of basins are: (1) reservoir construction; (2) irrigation and flooding of dry lands; (3) drainage of bogs and saturated soils; (4) land- and forest-improvement practices; (5) industrial and public water use, water withdrawals, and alteration of flow; (6) urbanization; and (7) mining operations and large groundwater withdrawals. Current methods used to evaluate the effect of man on hydrologic characteristics are included in two basic trends of investigations: (1) study of long-term fluctuations of runoff at key gaging stations and analysis of changes in meteorological factors and in development of human activities in basins; and (2) study of individual items in water and heat balances directly in watershed areas where formation and runoff of surface waters and groundwaters are influenced by man. Advantages and disadvantages of the two methods are analyzed. On the basis of investigations and summarization of sources in the literature, recommendations are made for developing effective methods of evaluating changes in hydrologic characteristics as a result of human activity. A program of calculations by BESM-4 digital computers based on the method of multiple linear correlation is described, and possibilities of expedient application of this program in investigations and calculations are discussed. (See also W74-10626) (Josefson-USGS)
W74-10627

IRRETRIEVABLE RUNOFF LOSSES OF THE VOLGA RIVER THROUGH EVAPORATION FROM RESERVOIRS OF THE VOLGA-KAMA CASCADE (BEZVOZVRATNYYE POTERI STOKA R. VOLGI ZA SCHET ISPARENIYA S VODOKHRANILISHCH VOLZHSKO-KAMSKOGO KASKADA),
Gosudarstvennyi Gidrologicheskii Institut, Leningrad (USSR).
For primary bibliographic entry see Field 4A.
W74-10628

CALCULATION OF GROUNDWATER RECHARGE AND EVALUATION OF THE EFFECT OF LAND- AND FOREST-IMPROVEMENT PRACTICES (RASCHET PITANIYA GRUNTOVYKH VOD I OTSENKA VLLYANIYA NA NEGO AGROLESOMELIORATIVNYKH MEROPRIYATIY),
Gosudarstvennyii Gidrologicheskii Institut, Leningrad (USSR).
V. Ye. Vodogretskiy.
In: Voprosy vliyaniya khozyaystvennoy deyatel'nosti na vodnyye resursy i vodnyy rezhim; Gosundarstvennyy Gidrologicheskiy Institut Trudy, No 206, p 52-91, Leningrad, 1973. 8 fig, 5 tab, 29 ref.

Descriptors: *Groundwater recharge, *Groundwater, *Land reclamation, *Forest management, *Watershedsbasins), Shelterbelts, Aquifers, Water table, Water levels, Water level fluctuations, Groundwater movement, Drawdown, Water wells, Water balance, Precipitation(Atmospheric), Water yield, Seasonal, Curves, Equations.
Identifiers: *USSR.

Present methods of determination of groundwater recharge are discussed, and procedures are outlined for calculation of groundwater recharge by rainfall penetration at individual points on a watershed. Changes in amount of groundwater recharge under the effect of fall plowing and forest cover during years of variable moisture are analyzed, and results of analysis are applied to different natural zones in European Russia and Northern Kazakhstan. Accuracy of computation of groundwater recharge depends on: (1) accuracy of measurement of groundwater levels; (2) accuracy of determination of groundwater yield in the zone of groundwater level fluctuations; (3) accuracy of calculation of groundwater discharge into water intakes by an indirect relation of the amount of depletion of groundwater storage in winter to groundwater level fluctuations. Major factors influencing the degree of variability of groundwater recharge under the effect of land- and forest-improvement practices in watersheds are atmospheric precipitation, soil particle size in the zone of aeration, soil lithological structure, and depth of groundwater occurrence. (See also W74-10626) (Josefson-USGS)
W74-10629

EVALUATION OF THE EFFECT OF HUMAN ACTIVITY ON RUNOFF OF LARGE RIVERS IN THE CAUCASUS (KURA, TEREK, KUBAN') (OTSENKA VLIYANIYA KHOZYAYSTVENNOY DEYATEL'NOSTI NA STOK KRUPNYKH REK KAVKAZA (KURA, TEREK, KUBAN')),
Gosudarstvennyi Gidrologicheskii Institut, Leningrad (USSR).
I. A. Shiklomanov, and L. Ye. Smirnova.
In: Voprosy vliyaniya khozyaystvennoy dayatel'nosti na vodnyye resursy i vodnyy rezhim; Gosudarstvennyy Gidrologicheskiy Institut Trudy, No 206, p 92-121, Leningrad, 1973. 7 fig, 11 tab, 18 ref.

Descriptors: *Runoff, *Discharge(Water), Rivers, *River basins, *Human population, Irrigation, Irrigated land, Water balance, Low flow, Seasonal, Annual, Variability, Correlation analysis, Regression analysis, Computers, Equations.
Identifiers: *USSR, *Caucasus Mountains, *Kura River(USSR), *Terek River(USSR), *Kuban' River(USSR).

Variability of annual runoff and of runoff during the growing season (April-October) under the effect of man was investigated in the Kura, Terek, and Kuban' River basins in Transcaucasia and the Northern Caucasus. The basic form of human activity in lowland areas is irrigated agriculture. During the last 40 years irrigated lands in the Kura-Mingechaur basin increased 2.5 fold and reached 560,000 ha in 1970. During the last 10 years annual runoff in the basin decreased, on the average, by about 5% and runoff during the warm season, by about 8%. In low-water years reduction in runoff reaches about 15%-20%. A systematic reduction in runoff occurs in the Terek River basin, where irrigation is intensely developed. During the last 10 years annual runoff of the Terek River decreased by approximately 20% and seasonal runoff by 25%. Providing human activity in the basin continues at the same rate, runoff is expected to decrease by about 50% by 1985. Runoff at the outlet gaging station on the Kuban' River decreased insignificantly during the last 10 years, although in the low-water years of 1969 and 1970 reduction in runoff was considerable (up to 15%). Other, less important, anthropogenic factors contributing to increased runoff losses are channel, regulation, drainage agricultural practices, industrial and public water use, and urbanization. (See also W74-10626) (Josefson-USGS)
W74-10630

HYDROLOGIC ASPECTS OF URBANIZATION (GIDROLOGICHESKIYE ASPEKTY URBANIZATSII),
Gosudarstvennyi Gidrologicheskii Institut, Leningrad (USSR).
V. V. Kupriyanov.
In: Voprosy vliyaniya khozyaystvennoy deyatel'nosti na vodnyye resursy i vodnyy rezhim; Gosudarstvennyy Gidrologicheskiy Institut Trudy, No 206, p 122-133, Leningrad, 1973. 4 fig, 3 tab, 14 ref.

Descriptors: *Hydrologic aspects, *Urbanization, *Urban hydrology, *Urban sociology, *Urban runoff, Urban drainage, Cities, Suburban areas, Watersheds(Basins), Discharge(Water), Floods, Low flow, Sediment transport, Water balance, Precipitation(Atmospheric), Evaporation, Foreign research, United States, Curves, Equations.
Identifiers: *USSR.

The impact of urbanization on water regime of an area and on quantitative and qualitative estimates of changes in water resources is examined. This impact can be evaluated on the basis of changes in the hydrologic regime of urban and suburban areas and on the basis of the effect of towns on water balance of immediate urban vicinities. Runoff from urban areas differs sharply from runoff from natural watersheds. Annual runoff from urban watersheds is generally considerably greater than that from nonurban areas. A significant hydrologic impact of urban development is reflected in the magnitude, volume, and duration of peak discharge and in the increase or decrease in low flows. Sediment movement is especially important in an area during highway construction. A review of the effects of urbanization on the hydrologic regime was based mainly on data of observations in the United States. (See also W74-10626) (Josefson-USGS)
W74-10631

IMPACT OF URBANIZATION ON QUALITY OF RIVER WATER (VLIYANIYE URBANIZATSII NA KACHESTVO RECHNYKH VOD),
Gosudarstvennyi Gidrologicheskii Institut, Leningrad (USSR).
For primary bibliographic entry see Field 5B.
W74-10632

PRELIMINARY ESTIMATE OF THE EFFECTS OF IRRIGATED AGRICULTURE ON STREAMFLOW IN THE LAKE BALKHASH BASIN (PREDVARITEL'NAYA OTSENKA VLIYANIYA OROSHAYEMOGO ZEMLEDELIYA NA RECHNOY STOK V BASSEYNE OZ. BALKHASH),
Gosudarstvennyi Gidrologicheskii Institut, Leningrad (USSR).
A. B. Zavodchikov.
In: Voprosy vliyaniya khozyaystvennoy deyatel'nosti na vodnyye resursy i Leningrad, 1973. 7 fig, 2 tab, 21 ref.

Descriptors: *Lake basins, *Streamflow, *Runoff, *Agriculture, *Irrigation programs, Irrigation systems, Irrigation practices, Irrigation water, Return flow, Rates of application, Precipitation(Atmospheric), Air temperature, Evaporation, Transpiration, Runoff coefficient, Watersheds(Basins), Rivers, Correlation analysis, Regression analysis, Curves, Estimating.
Identifiers: *USSR, *Lake Balkhash.

The effect of irrigation on seasonal distribution of runoff into Lake Balkhash was investigated. Major rivers flowing into the lake are the Ili, Karatal, Aksu, Lepsy, and Ayaguz with a total annual runoff of about 18 cu km. The proportion of

Ili River runoff is 75-80% or approximately 14 cu km. Investigations were carried out on the Ili River, Karatal River and its left-bank tributary--the Koksu, and on the Lepsy and Sarkand Rivers. Under the present system and intensity of irrigation in these and most other river basins, there is no marked reduction in mean annual runoff. However, irrigation may have some effect on runoff of the Karatal and Lepsy Rivers in whose basins irrigation is strongly developed. During the last 10 years runoff of these rivers decreased by approximately 15-20%, and reduction in mean annual runoff was 5-7%. Runoff of the Ili River remained practically the same, except for the period 1961-1970. (See also W74-10626) (Josefson-USGS)
W74-10633

OVERLAND FLOW AND ITS VARIABILITY UNDER THE EFFECT OF AGRICULTURAL AND FOREST-IMPROVEMENT PRACTICES (SKLONOVYY STOK I YEGO IZMENENIYE POD VLIYANIYEM AGROTEKHNICHESKIKH I LESOMELIORATIVNYKH MEROPRIYATIY),
Gosudarstvennyi Gidrologicheskii Institut, Leningrad (USSR).
For primary bibliographic entry see Field 4A.
W74-10634

DRAINAGE OF LEVEL OR NEARLY LEVEL ROADS,
Transport and Road Research Lab., Crowthorne (England). Structural Properties Div.
A. C. Whiffin, and C. P. Young.
Available from NTIS, Springfield, Va 22161 as PB-228 129 Price $5.25 printed copy; $2.25 microfiche. Report LR 602, 1973. 37 p, 9 fig, 11 tab, 4 ref, 5 append.

Descriptors: *Road design, *Urban hydrology, *Storm runoff, Drainage systems, Storm drains, Equations, Steady flow, Slopes, Outlets.
Identifiers: *Road drainage.

The drainage of surface water from roads of constant crossfall is analyzed. This may involve a channel of constant depth along the lower edge with outlets at regular intervals, or a channel formed by a raised curb with outlets at regular intervals. Because the theoretical equations are comparatively complex and not suitable for use in design offices, the results were analyzed statistically to give a simpler formula. Tables are provided which give the solutions for a wide variety of conditions. (Knapp-USGS)
W74-10660

4D. Watershed Protection

EROSION OF THE NORTH SHORE OF LONG ISLAND,
State Univ. of New York, Stony Brook. Marine Sciences Research Center.
For primary bibliographic entry see Field 2J.
W74-10440

EROSION CONTROL SAVES SOIL NUTRIENTS,
Agricultural Research, Vol 22, No 7, p 6-7, January, 1974. 1 fig.

Descriptors: *Erosion control, *Contour farming, *Cover crops, Erosion, Soil conservation, Soil management, *Terracing, Vegetation establishment, *Surface runoff, *Nutrient removal.

The application of soil erosion control methods in eliminating fertilizer nitrogen and phosphorus as pollutants in surface runoff is described. In a three-year study on adjacent watersheds near Treynor, Iowa, it was demonstrated that when corn was fertilized at two and a half times the recommended rate, only one thirteenth as much nitrogen and one tenth as much phosphorus was lost in runoff when erosion was effectively restricted as when it was not. The corn was grown on the watershed protected by level terraces, on two watersheds farmed on the contour, and on a fourth watershed which was bromegrass pasture. Terracing was the more effective means of restricting runoff and soil erosion on cropped land. Average annual loss of nitrogen in all forms was 28.8lb/ acre with contouring, 2.7lb with terracing, and 2.1lb with grass. Significantly, 92% of the total nitrogen loss from contour-farmed watershed, and 86% from the terraced watershed, was associated with sediment. A critical period for nutrient losses was during seedbed preparation and the establishment of crop. Differences in phosphorus losses from the four watersheds were similar to those for nitrogen. (Merritt-FIRL)
W74-10456

ADJUSTABLE WATER LEVEL AND EROSION CONTROL DEVICE,
For primary bibliographic entry see Field 3F.
W74-10589

5. WATER QUALITY MANAGEMENT AND PROTECTION

5A. Identification Of Pollutants

SALINE GROUNDWATERS PRODUCED WITH OIL AND GAS,
Bureau of Mines, Bartlesville, Okla. Bartlesville Energy Research Center.
A. G. Collins.
Copy available from GPO Sup Doc as EP1.23:66012-74-010, $1.15 paper copy; microfiche $2.25 from NTIS, Springfield, Va 22161 as PB-234 385. Environmental Protection Agency, Technology Series Report EPA-660/2-74-010, April 1974. 68 p, 19 fig, 10 tab, 20 ref, 2 append. Project EPA 16060 EQQ.

Descriptors: *Data processing, *Data storage and retrieval, *Saline water, *Brines, Connate water, Desalination, Descaling, Saline water systems, Water pollution sources, Encroachment, *Oil wells, Saline water intrusion, Aquifers, Groundwater, Subsurface waters, Water chemistry, Water reuse, *Salts, *Mapping, Subsurface mapping, Distribution patterns, *Brine disposal injection wells, Pollutant identification, Data collections.
Identifiers: *Recovery(Minerals), Recovery costs, Saline groundwater, *STORET system.

More than 60,000 saline water analyses were collected by the U.S. Bureau of Mines for entry into an automatic data processing system. Screening of the data eliminated 30,000 analyses; 20,000 were entered into STORET, the data processing system formulated by the Environmental Protection Agency. The water analyses are used in studies related to identifying the source of a brine, classification of groundwater for use in geochemistry, plotting local and regional salinity maps, determining sources of pollution of freshwater and land by brines, and studies of the use of saline water for desalination to produce freshwater and valuable minerals. Examples of each of these studies are given. Irresponsible control of brines can seriously pollute freshwater and land. The analyses now in STORET should be wisely used in pollution prevention programs. Additional analyses should be entered into STORET to aid groundwater and land pollution prevention programs. The most important factores are the potentials that exist for using the data in studies related to pollution abatement and exploration for minerals. (EPA)
W74-10411

MEASUREMENTS OF THE DISTRIBUTION AND VOLUME OF SEA-SURFACE OIL SPILLS USING MULTIFREQUENCY MICROWAVE RADIOMETRY,
Hulbert (E.O) Center for Space Research, Washington, D.C. Space Sciences Div.
For primary bibliographic entry see Field 5B.
W74-10429

MEASUREMENT OF ENVIRONMENTAL POLLUTION AND ITS SYSTEMIZATION,
Hitachi Ltd., Tokyo (Japan).
K. Sakai, J. Sasama, N. Matsui, K. Kashiwazako, and T. Arai.
Available from NTIS, Springfield, Va 22161 as N74-14266, Price $3.00 printed copy; $2.25 microfiche. Translation Report 294-73, of Hitachi hyoron (Hitachi Review), Vol 54, No 6, June 1972. 30 p, 11 fig, 4 tab, 8 ref.

Descriptors: *Instrumentation, *Monitoring, *Air pollution, *Water pollution, Pollutant identification, Pollution abatement, Regulation, *United States, *Measurement.
Identifiers: *Japan, *USSR.

Measuring instruments newly developed to comply with the requirements of regulations for the measurement of both air and water pollution in Japan, the USA, and the USSR are discussed. Some examples are given of their application in computer systems for overall pollution surveys. (Knapp-USGS)
W74-10438

DETERMINATION OF TRACES OF COPPER, LEAD, CADMIUM, NICKEL, ZINC AND IRON IN SILVER HALIDES BY PULSE POLAROGRAPHY,
Bologna Univ. Ciamician Chemical Inst. (Italy).
M. Taddia, M. T. Lippolis, and P. Lanza.
Electroanalytical Chemistry and Interfacial Electrochemistry, Vol 51, No 1, p 221-225, March, 1974. 2 fig, 1 tab, 12 ref.

Descriptors: *Trace elements, *Polarographic analysis, Copper, Lead, Cadmium, Nickel, Zinc, Iron, Methodology, *Pollutant identification.
Identifiers: *Silver halides, Pulse polarography.

A method is described for the analysis of traces of copper, lead, cadmium, zinc, nickel, and iron in silver halides by pulse polarography with the standard addition procedure. Copper, lead, cadmium nickel, and zinc were determined after dithizone extraction. Iron was determined after oxine extraction. For elements added at 6-1 ppm levels, the accuracy was better than 10%. (Merritt-FIRL)
W74-10447

THE EFFECT OF ACID CONCENTRATION ON THE DETERMINATION OF DICHROMATE VALUE,
Salford City Sewage Works(England).
T. Stones.
Water Pollution Control, Vol 78, No 1, p 121-124, 1974. 7 fig, 3 tab, 3 ref.

Descriptors: *Sewage, Methodology, Investigations, Acidity, Decomposition, Sulfuric acid, Industrial wastes, Oxidation, *Pollutant identification, Chromium.
Identifiers: *Dichromates, Potassium dichromate, *United Kingdom(England).

A procedure for the determination of the dichromate value of sewage was reinvestigated to avoid significant losses of dichromate due to decomposition. The procedure recommended that the volume of sulfuric acid used should be 1.2 times the aqueous volume, i.e., 54.5% of the total volume. Various amounts of water were added to a series of flasks containing 25 ml of N/4 potassium dichromate solution, 80 ml of sulfuric acid, and 10 ml of 0.63% W/V of silver sulfate in sulfuric acid. After refluxing for 2 hr, the residual amounts of dichromate were determined. The results show that the

decomposition of the dichromate, which begins when the acid concentration exceeds about 45% V/V, increases rapidly above 55% and is complete at 80%. Increasing the acid concentration leads to an elevation of the boiling point of the solution, and the breakdown of the dichromate was due to thermal decomposition. In determining the dichromate value of a sewage or an industrial waste water an appropriate correction must be made for the amount of dichromate decomposed. This will not be constant but will be dependent upon the amount of dichromate which is in excess of that required for oxidation. (Merritt-FIRL)
W74-10448

RAPID DETERMINATION OF THE PRESENCE OF ENTERIC BACTERIA IN WATER,
Atlantic Research Corp., Alexandria, Va.
R. P. Kenard, and R. S. Valentine.
Applied Microbiology, Vol 27, No 3, p 484-487, March, 1974. 3 fig, 10 ref.

Descriptors: *Bacteria, Analytical techniques, *Bacteriophage, Microbiology, Coliforms, *Enteric bacteria, Water sampling, *Pollutant identification.
Identifiers: *Coliphage, Virulent bacteria, Computer analysis, Fecal coliforms, Virulent bacteriophage.

A rapid and sensitive method is described for the detection of bacteria in water and various other natural substrates by the isolation of specific bacteriophage. By the addition of large numbers of the organism in question to the sample, the presence of virulent bacteriophage is demonstrated in as little as six to eight hours. Fecal coliform, total coliform, and total coliphage counts were determined for over 150 water samples from several geographical areas over a period of two years. Computer analysis of the data shows a high degree of correlation between fecal coliforms and the coliphage present in the samples. With a high correlation coefficient between fecal coliform and coliphage counts, predictions of the fecal coliforms may be made by enumeration of the phage. (Prague-FIRL)
W74-10449

ADVANCED X-RAY CRAWLER.
For primary bibliographic entry see Field 8C.
W74-10450

ATOMIC ABSORPTION SPECTROPHOTOMETER FACILITATES WATER ANALYSIS,
Water and Sewage Works, Vol 121, No 1, p 27, 45, January, 1974.

Descriptors: *Municipal water, Instrumentation, *Spectrophotometry, *New York, Municipal wastes, Metals, *Pollutant identification.
Identifiers: *Atomic absorption.

The use of atomic absorption spectrophotometer for analyzing water at the Ben Nesin Laboratory (New York) is described. The laboratory is one of seven which analyzes water from 18 reservoirs and four controlled lakes which supply New York City. At Ben Nesin, 40,000 samples a year are collected and 400,000 annual analyses performed, checking for 60 different substances, inclusive of heavy and trace metals. The atomic absorption technique is based on the fact that the atoms of an element will when vaporized, absorb radiation passed through them at specific wavelength limits which are different for each element. For the detection and measurement of most metals, the instrument vaporizes the sample by flame in an air-acetylene, or air-propane burner. Samples being tested for cadmium, copper, cobalt, nickel, and lead are extracted with sodium hydroxide and hydrochloric acid. Concentrated solutions are prepared for analysis of zinc, chromium, strontium, iron, and manganese. Silver, sodium, cadmium are run without concentration. The spectrophotometer is extremely reliable and sensitive, more so than automated monitoring systems. (Merritt-FIRL)
W74-10464

FLUID POLLUTION MONITORING APPARATUS AND METHOD,
H. S. Hayre.
U. S. Patent 3,791,200. Issued February 12, 1974. Official Gazette of the U. S. Patent Office, Vol 919, No 2, p 471, February 12, 1974.

Descriptors: Equipment, *Instrumentation, *Acoustics, *Patents, *Effluents, *Pollutant identification, Fluid mechanics.

A new and improved method and apparatus for monitoring fluids to determine the presence of pollutants in the fluids are described. The type and quantity of pollutants are identified by analysis of the acoustic impedance properties of the fluid. (Merritt-FIRL)
W74-10485

MICROBIOLOGICAL WATER SAMPLERS, (IN RUSSIAN),
Akademiya Nauk SSSR, Moscow. Institut Biologii Vnutrennykh Vod.
For primary bibliographic entry see Field 7B.
W74-10517

WATER QUALITY CRITERIA DATA BOOK - VOL. 5 - EFFECTS OF CHEMICALS ON AQUATIC LIFE,
Battelle Columbus Lab., Ohio.
For primary bibliographic entry see Field 5C.
W74-10541

LOW WINTER DISSOLVED OXYGEN IN SOME ALASKAN RIVERS,
Environmental Protection Agency, College, Alaska. Arctic Environmental Research Lab.
For primary bibliographic entry see Field 5B.
W74-10546

MULTIELEMENT ANALYSIS OF ENVIRONMENTAL SAMPLES BY SPARK SOURCE MASS SPECTROMETRY,
Environmental Protection Agency, Athens, Ga. Southeast Environmental Research Lab.
C. E. Taylor, and W. J. Taylor.
Copy available from GPO Sup Doc as EP1.23:660/2-74-001, $0.65; microfiche from NTIS, Springfield, Va 22161 as PB-234 456, $2.25. Environmental Protection Agency, Technology Series Report EPA-660/2-74-001, January 1974. 23 p, 5 fig, 5 tab, 4 ref. EPA Project 16ADN-22. Program Element IBA027.

Descriptors: *Mass spectrometry, *Trace elements, *Chemical analysis, *Analytical techniques, Water pollution, *Sediments, *Pollutant identification, Water analysis.
Identifiers: Spark source mass spectrometry, Computerized data system, Electrical detection.

A spark source mass spectrometer that uses electronic detection and a dedicated data analysis system was applied to a survey type trace analysis for chemical elements. Errors in the data system software were identified and corrected. Modifications to the system permit identification and quantitation of 72 elements at the part per billion level in water samples. (EPA)
W74-10547

EFFECTS OF COPPER, ZINC, AND CADMIUM ON SELANASTRUM CAPRICORNUTUM,
Idaho Univ., Moscow. Dept. of Biological Sciences.
For primary bibliographic entry see Field 5C.
W74-10563

THE DESIGN OF SAMPLING PROGRAMMES FOR RIVERS AND EFFLUENTS,
Water Pollution Research Lab., Stevenage (England).
For primary bibliographic entry see Field 7A.
W74-10576

PROCESS INNOVATIONS.
Canadian Chemical Processing, Vol 58, No 3, p 8-10, March, 1974.

Descriptors: Analytical techniques, Water pollution sources, *Fluorescence, *Oil wastes, Oil spills, Rhodamine, Dyes, *Remote sensing, *Pollutant identification.
Identifiers: *Lasers.

Water pollution can be detected at night by a new airborne instrument. A blue light from a low-powered laser excites fluorescence in the target area, an eight-inch telescope focussed on this area collect the light. Optical filters are used to block the reflected laser light and select pertinent wavelengths from the fluroescent spectrum of the target. This light is converted to an electrical signal by a photomultiplier tube, processed and recorded on a strip chart. It has two advantages over other systems: it is small and light, and does not require a sample of the material to be identified. The apparatus has detected fluorescence from oil refinery wastes and pulpmills' settling ponds, as well as controlled spills of oils and dyes. The instrument has measured the fluorescence of water at ranges up to 75 meters and detected oil slicks from altitudes of 300 meters. It has also detected rhodamine dye and chlorophyll in open water, and lignin sulphonates in pulpmill ponds. At ground level, the system has been used to examine river water and on board a ship to monitor chlorophyll concentrations in Lake Erie. (Murphy-FIRL)
W74-10605

QUALITY OF SURFACE WATERS OF THE UNITED STATES, 1968: PARTS 12-16. NORTH PACIFIC SLOPE BASINS, ALASKA, HAWAII, AND OTHER PACIFIC AREAS.
Geological Survey, Washington, D.C.
Available from Superintendent of Documents GPO, Washington, D.C. 20402 Price $3.05 paper cover. Water-Supply Paper 2100, 1973. 464 p, 1 fig, 39 ref.

Descriptors: *Water quality, *Pacific Northwest U.S., *Surface waters, *United States, Dissolved solids, Streamflow, Solutes, Trace elements, Dissolved oxygen, Sediment load, Water temperaure, Water pollution, Hawaii.

Data are compiled on water quality in the North Pacific Slope Basins, Alaska, Hawaii, and other Pacific Areas of the U.S. The records of chemical analysis, water temperature, and suspended sediment of surface waters given in this volume serve as a basis for determining the suitability of waters for various uses. The records are listed by drainage basins in a downstream direction along the main stream. All stations on a tributary entering above a mainstream station are listed before that station. Descriptive statements are given for each sampling station where chemical analyses, temperature measurements, or sediment determinations have been made. These statements include location of the station, drainage area, periods of records available extremes of dissolved solids, hardness, specific conductance, temperature, sediment loads, and other pertinent data. Records of discharge of the streams at or near the sampling station are included in most tables of analyses. (Knapp-USGS)
W74-10616

QUALITY OF SURFACE WATERS OF THE UNITED STATES, 1968: PART 7. LOWER MISSISSIPPI RIVER BASIN.
Geological Survey, Washington, D.C.

Available from Superintendent of Documents GPO, Washington, D.C. 20402 Price $2.95 paper cover. Water-Supply Paper 2096, 1973. 438 p, 1 fig, 39 ref.

Descriptors: *Water quality, Mississippi River basin, *Surface waters, United States, Dissolved solids, Streamflow, Solutes, Trace elements, Dissolved oxygen, Sediment load, Water temperature, Water pollution.

The records of chemical analysis, water temperature, and suspended sediment of surface waters of the lower Mississippi River basin given in this volume serve as a basis for determining the suitability of waters for various uses. The records are listed by drainage basins in a downstream direction along the main stream. All stations on a tributary entering above a mainsteream station are listed before that station. Descriptive statements are given for each sampling station where chemical analyses, temperature measurements, or sediment determinations have been made. These statements include location of the station, drainage area, periods of records available, extremes of dissolved solids, hardness, specific conductance, temperature, sediment loads, and other pertinent data. Records of discharge of the streams at or near the sampling station are included in most tables of analyses. During the water year ending September 30, 1968, the Geological Survey maintained 237 stations on 149 streams for the study of chemical and physical characteristics of surface water. Samples were collected daily and monthly at 232 of these locations for chemical-quality studies. (Knapp-USGS)
W74-10617

EVALUATION OF A HOLLOW SPHERICAL CAVITY WITH A CIRCULAR APERTURE AS A REMOTE SENSOR OF ATMOSPHERIC INDEX OF REFRACTION,
Texas Univ., Austin. Antennas and Propagation Lab.
For primary bibliographic entry see Field 7B.
W74-10649

REMOTE SENSING REPORT, SAN FRANCISCO BAY AREA, APRIL-JULY 1972. VOLUME I.
National Field Investigations Center-Denver, Colo.
Available from NTIS, Springfield, Va 22161 as PB-227 834, Price $12.75 printed copy; $2.25 microfiche. Environmental Protection Agency Office of Enforcement report, April 1973. 186 p, 72 fig, 3 append.

Descriptors: *Remote sensing, *California, *Path of pollutants, Water pollution sources, Thermal pollution, Industrial wastes, Municipal wastes.
Identifiers: *San Francisco Bay.

An aerial remote sensing program was carried out in the San Francisco Bay Area in April and July 1972 to study water pollution. Location and description of industrial discharges were found during day and night-time periods. The presence of and dispersion patterns for the Bay area municipal sewage treatment plant (STP) discharges during day and night-time periods were documented. The flow patterns of Bay waters were mapped. (Knapp-USGS)
W74-10654

USE OF WHATMAN-41 FILTERS IN AIR QUALITY SAMPLING NETWORKS (WITH APPLICATIONS TO ELEMENTAL ANALYSIS),
National Aeronautics and Space Administration, Cleveland, Ohio. Lewis Research Center.
H. E. Neustadter, S. M. Sidik, R. B. King, J. S. Fordyce, and J. C. Burr.
Available from NTIS, Springfield, Va 22161 as NASA TN D-7595 Price $3.75 printed copy; $2.25 microfiche. Technical Note NASA TN D-7595, May 1974. 61 p, 4 fig, 7 tab, 26 ref, 2 append.

Descriptors: *Sampling, *Air pollution, *Filters, Filtration, Monitoring, Suspended load, Chemical analysis, Equipment, Pollution identification.

A 16-site parallel high volume air sampling network compared glas fiber filters on one unit and Whatman-41 filters on the other. Sampler-to-sampler and filter-to-filter variabilities are small. Hygroscopic affinity of Whatman-41 filters need not introduce errors. Suspended particulate samples from glass fiber filters were slightly, but not statistically significantly, higher than from Whatman-41 filters. The results obtained demonstrate the practicability of Whatman-41 filters for air quality monitoring and elemental analysis. (Knapp-USGS)
W74-10666

MICROWAVE AND SPECTRA OF SOME SULFUR AND NITROGEN COMPOUNDS,
National Aeronautics and Space Administration, Langley Station, Langley Research Center.
W. F. White.
Available from NTIS, Springfield, Va 22161 as NASA TN D-7450 Price $4.50 printed copy; $2.25 microfiche. Technical Note D-7450, May 1974. 105 p, 3 fig, 7 ref.

Descriptors: *Chemical analysis, *Microwaves, *Sulfur compounds, *Nitrogen compounds, *Pollutant identification.
Identifiers: *Microwave spectroscopy.

Microwave absorption spectra suitable for chemical analysis are listed. Most of the measurements were made by a computer controlled, Stark modulated spectrometer in the frequency range 26,500 to 40,000 MHz, with a few spectra in the range 18,000 to 26,550 MHz. Measurements of absorption frequency, peak intensity, and integrated intensity are included along with experimental conditions, such as Stark field intensity, sample temperature and pressure, and microwave power level. Spectral data are given for the following compounds: acetonitrile, ammonia, 3-butenenitrile, carbon oxide sulfide, dimethyl disulfide, ethanamine, ethanethiol, ethylene glycol cyclic sulfite, formamide, hydrocyanic acid, isoxazole, methanamine, methanethiol, methyl sulfide, methyl thiirane, nitroethane, nitromethane, propanenitrile, 2-propenenitrile, 2-propene-1-thiol, pyridine, pyrrole, sulfur dioxide, tetrahydrothiophene, thiazole, thietane, thiirane, and thiophene. (Knapp-USGS)
W74-10683

MERCURY DYNAMICS IN A WARM WATER STREAM,
Michigan State Univ., East Lansing. Dept. of Fisheries and Wildlife.
For primary bibliographic entry see Field 5B.
W74-10692

MECHANISM OF RESPIRATORY EXCHANGES IN AQUATIC ENVIRONMENT: A GENERAL REVIEW INCLUDING PERSONAL RESULTS,
Amiens Univ. (France). Laboratoire de Physiologie.
P. Harichaux, A. Poizot, and M. Freville.
Rev Int Oceanogr Med. 27 p 71-84. 1972. Illus.
Identifiers: Aquatic environment, Respiratory exchanges, Reviews, *Respiration, *Measurement, *Phosphorus compounds, Fish, Instrumentation.

Respiration in aquatic environment is reviewed. An original device for continuous measuring of PO2 and PCO2 variations in the aquatic environment of the fish is described. Oxygen consumption, according to factors intrinsic in fish (weight, species) or extrinsic in the aquatic environment (ambient temperature and chemical factors of pollution), can be computed.--Copyright 1973, Biological Abstracts, Inc.
W74-10713

ANALYSIS OF POLLUTANTS - PROPOSED TEST PROCEDURES.
Environmental Protection Agency, Washington, D.C.
Federal Register, Vol 38, No 125, p 17318-17323, June 29, 1973.

Descriptors: *Regulation, *Measurement, *Administrative agencies, *Permits, Environmental sanitation, Federal government, Water pollution sources, Planning, Adoption of practices, Water conservation, Decision-making, Specifications, Data collections, Evaluation, Sampling, Testing, Test procedures, Water quality control, Sewage effluents, Waste water discharge, Pollutants.
Identifiers: *FWPCA Amendments of 1972, *Administrative regulations, Hazardous substances(Pollution).

The Environmental Protection Agency has proposed regulations pursuant to the Federal Water Pollution Control Act Amendments of 1972 setting forth required test procedures for the analysis of pollutants. The procedures were formulated as a result of extensive laboratory comparisons, both in-house and with extramural public and private participants. The use of other methods are permitted if they are approved by the Regional Administrator. Applicators for a permit may be required to submit analyses of pollutants. Prior to this, the Regional Administrator should be consulted on the acceptability of the procedures for measurements. A list of substances and their corresponding measurement techniques are delineated in the regulations. Comments, suggestions, and objections to the proposed regulations are invited. Eleven replicate analyses shall be performed on each of the three effluent samples collected during a twenty-four hour period of continuous discharge. One sample will contain the maximum amount of pollutant observed during the twenty-four hour period. A second will contain the minimum amount, and the third, an intermediate amount. (Sperling-Florida)
W74-10725

THE RAPS PROGRAM,
Environmental Protection Agency, Research Triangle Park, N.C. Chemistry and Physics Lab.
P. Hanst.
In: American Ordnance Association Proceedings of 3rd Meeting on Environmental Pollution May 17-18, 1972. Fort McNair, Washington, D.C., p 151-162, 1973. 10 fig.

Descriptors: *Cities, *Air pollution, *Investigations, Atmosphere, Smog, Monitoring, Model studies, *Missouri.
Identifiers: *Regional Air Pollution Study, *St. Louis(Mo), Atmospheric processes, Emissions, Air pollution control.

The Regional Air Pollution Study (RAPS) is a five-year program of air pollution research and is a continuation of research programs which have been developing an understanding of atmospheric processes and techniques for air pollution control. It is mainly a study of transport and transformations of air pollutants with the intention to improve the scientific and engineering bases from which optimum air pollution control strategies for urban areas can be devised. The concern is mainly with photochemical smog. The basic photochemical reaction cycle of gaseous reactions in the lower atmosphere is illustrated. The particulate matter is the most obvious portion of the pollution but it still is the least understood. Smog particles are formed from gases; they do not fall out, but are removed mainly in the dissipation of the smog by mixing and diffusion and perhaps by evaporation. An emissions inventory is a prerequisite to developing an understanding of the transport and transformation processes in any area. Descriptive and predictive models are being developed to enable fairly reliable forecasts of air pollution to be made. St. Louis is the metropolitan area chosen for study. (See also W74-10765) (Jones-Wisconsin)

W74-10777

MARINE POLLUTION BY HYDROCARBONS IN THE NORTHERN ADRIATIC SEA,
Trieste Univ. (Italy). Inst. of Hygiene.
For primary bibliographic entry see Field 5B.
W74-10794

A MODIFIED PROCEDURE FOR THE TTC-DEHYDROGENASE TEST IN ACTIVATED-SLUDGE,
Agricultural Univ., Wageningen (Netherlands). Dept. of Water Purification.
A. Klapwijk, J. Drent, and J. H. A. M. Steenvoorden.
Water Research, Vol 8, No 2, p 121-125, 1974. 7 fig, 4 tab, 13 ref.

Descriptors: *Activated sludge, *Analytical techniques, Toxicity, Oxygen demand, Zinc, Phenols, *Pollutant identification, 2,4-D.
Identifiers: *TTC-dehydrogenase, Formazan, Cyanide.

The procedure for the determination of TTC-dehydrogenase activity of activated sludge has been critically examined with respect to the termination of the enzyme reaction, the extraction of formazan (TF), the exclusion of oxygen in the sample, the incubation temperature and the organic substrate used. The dehydrogenase activity measured by a modified TTC test correlates fairly well with oxygen uptake. Toxic substances such as zinc, phenol, cyanide and 2-4D do not influence the oxygen uptake and dehydrogenase activity to the same extent. (Murphy-FIRL)
W74-10817

THE DETERMINATION OF VEGETABLE AND MINERAL OILS IN THE EFFLUENTS AND SEWAGE SLUDGES OF THE UPPER TAME BASIN,
Upper Tame Main Drainage Authority, Birmingham (England).
M. Bennett, H. J. Dee, and N. Harkness.
Water Research, Vol 7, No 12, p 1849-1859, 1973. 6 fig, 3 tab, 20 ref.

Descriptors: Analysis, Analytical techniques, *Spectrophotometry, *Chromatography, Chemical analysis, *Oil, *Sewage sludge, *Pollutant identification.
Identifiers: Liquid-liquid extraction, Soxhlet extraction, *Thames River(U.K.).

A method for the quantitative analysis of vegetable and mineral oils in effluents and sewage sludges is described. The oils are extracted from acidified effluents by a liquid-liquid extraction, and from acidified dried sewage sludges by Soxhlet extraction using carbon tetrachloride as solvent. The vegetable oil is transesterified at room temperature, quantitatively estimated by gas-liquid chromatography, and neutralized. After separation of the methyl esters of the vegetable oils on a silica gel column, the mineral oils are qualitatively estimated by gas-liquid chromatographic 'fingerprinting' analysis, and quantitatively estimated by infrared spectrophotometric methods. (Murphy-FIRL)
W74-10818

DETERMINATION OF MERCURY IN WATER BY THE FLAMELESS ATOMIC ABSORPTION METHOD (HIGANY MEGHATAROZASA VIZBEN LANG NELKULI ATOMABSZORPCIOS MODSZERREL),
E. G. Harsanyi, L. Polos, L. Bezur, and E. Pungor.
Magyar Kemiai Folyoirat, Vol 79, No 11, p 471-476, November, 1973. 9 fig, 1 tab, 40 ref. English summary.

Descriptors: *Mercury, Metals, Water pollution, *Analytical techniques, Water pollution sources, *Pollutant identification.
Identifiers: *Atomic absorption, Flameless atomic absorption.

In comparison with other analytical procedures, the flameless atomic absorption method has a great advantage in the determination of small amounts of mercury in water and biological materials because of its simplicity and sensitivity. A system has been constructed in which mercury is reduced by tin (II) chloride, and the vapor is driven into the absorption cuvette by an air stream. In a volume of 100 cu cm water the detection limit was four nanograms with a reproducibility of 2-7 percent. An enrichment method has also been elaborated. It is based on the tin (II) chloride reduction technique. According to the procedure, mercury is reduced in a volume of 800 cu cm and driven into a 50 cu cm solution volume where it is absorbed under oxidative conditions. The mercury is then reduced in the smaller volume again with tin (II) chloride. The mercury vapor driven out from the solution is measured by the atomic absorption method. The detection limit of the technique has been found to be 0.008 ng/cu cm, its variation coefficient being four percent and the efficiency of the enriching operation 93 percent. (Murphy-FIRL)
W74-10819

CONFIRMATION STUDIES ON POLYCHLORINATED BIPHENYLS (PCB) FROM RIVER WATERS USING MASS FRAGMENTOGRAPHY,
Goteborg Univ. (Sweden). Dept. of Analytical Chemistry.
M. Ahnoff, and B. Josefsson.
Analytical Letters, Vol 6, No 12, p 1083-1093, 1973.

Descriptors: *Analytical techniques, *Mass spectrometry, Water pollution, Chlorine, *Polychlorinated biphenyls, Water pollution sources, *Pollutant identification.
Identifiers: *Fragmentography, Multiple ion defection.

A sensitive method for confirming the presence of polychlorinated biphenyls (PCB) in river water is detailed. Mass fragmentography is shown to be a helpful technique especially when using naturally-occurring stable isotopes of chlorine. Synthesized tetrachloro-, pentachloro- and hexachloro biphenyls were used to focus the mass spectrometer at the three selected masses, so-called multiple ion detection (MID). (Murphy-FIRL)
W74-10820

ARSENIC-CONTAINING CARBONATED WATERS, OCCURRENCE PECULIARITIES, CHEMICAL COMPOSITION, OCCURRENCE CONDITIONS (MYSH'YAKSODERZHASHCHIYE UGLEKISLYE VODY KAVKOZA (OSOBENNOSTI RASPROSTRANENIYA, KHIMICHESKIY SOSTAV, USLOVIYA FORMIROVANIYA)),
All-Union Scientific Research Inst. of Hydrogeology and Engineering Geology, Moscow (USSR).
For primary bibliographic entry see Field 2K.
W74-10884

5B. Sources Of Pollution

A GROUNDWATER QUALITY MODEL: A HYBRID COMPUTER SIMULATION,
California Univ., Los Angeles. School of Engineering and Applied Science.
T. M. Simundich.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-234 338; $8.75 in paper copy, $2.25 in microfiche. MS Thesis, 1971. 103 p, 22 fig, 30 ref, 3 append. OWRR B-150-CAL(16).

Descriptors: *Groundwater basins, *Hydrologic models, *Simulation analysis, Mathematical models, *California, Computer models, Water quality, Water pollution sources, *Dissolved solids.
Identifiers: *Raymond Basin(Calif).

A groundwater total dissolved solids (TDS) quality model is formulated for the saturated zone of an aquifer in a particular basin. The governing equations of the model are expressed as a computer program and are solved using the DSDT computer so as to yield a time and space description of the groundwater TDS quality of the basin. The model simulates the TDS quality behavior of the basin for a five year period. The following conclusions are reached: (1) A feasible, accurate mathematical groundwater TDS quality model of the basin was developed; (2) Distributed inputs dominate in a groundwater quality model for a near term period (less than 30 years); (3) Water TDS quality data are not adequate for the verification of a groundwater TDS quality model; (4) The DSDT method can be employed for implementing a groundwater TDS quality model for a small basin. Also, an investigation is made into a new modeling approach which maximizes the utility of the existing data of semi defined systems. This approach attempts to extract features from the prototype data which should be included in the model. However, it is concluded for groundwater TDS quality modeling this approach is of limited utility. (Snyder-California)
W74-10352

QUALITY OF SURFACE WATERS OF THE UNITED STATES, 1968: PARTS 9 AND 10, COLORADO RIVER BASIN AND THE GREAT BASIN.
Geological Survey, Washington, D.C.
For primary bibliographic entry see Field 7C.
W74-10353

THE OXIDATION RATE OF SULPHIDE IN SEA WATER,
Goteborg Univ., (Sweden). Dept. of Analytical Chemistry.
T. Almgren, and I. Hagstrom.
Water Research, Vol 8, No 7, p 395-400, July 1974. 7 fig, 2 tab, 10 ref.

Descriptors: *Sulfides, *Oxidation, *Sea water, *Path of pollutants, Industrial wastes, Water chemistry, Dissolved oxygen, *Water pollution sources.

The order and rate of the oxidation of sulfide by oxygen in sea water at pH 8.0 and 8.5 were determined by computer processed potentiometric measurements made with an Ag/Ag2S membrane electrode. The reaction proceeds through a pseudo first-order mechanism when excess oxygen is present. The pH dependence is complex and probably influenced by catalysts. The microbial activity was briefly studied; no changes in reaction rate were observed between sterilized and non-sterilized samples. Bacteria do not take part in the rate-determining removal of sulfide. (Knapp-USGS)
W74-10365

DISTRIBUTION OF ARSENIC IN DEEP GROUNDWATER OF THE MIDDLE CASPIAN ARTESIAN BASIN (K VOPROSU O RASPREDELENII MYSH'YAKA V GLUBOKIKH PODZEMNYKH VODAKH SREDNEKASPIYSKOGO ARTEZIANSKOGO BASSEYNA),
Vsesoyuznyi Nauchno-Issledovatelskii Institut Prirodnykh Gaza, Moscow (USSR)
V. N. Kortsenshteyn, A. P. Karaseva, and A. K. Aleshina.
Geokhimiya, No 4, p 612-617, April 1973. 3 fig, 2 tab.

Descriptors: *Geochemistry, Groundwater, *Groundwater basins, *Artesian aquifers, Confined water, Chlorine, Rocks, Geologic time, Sampling, Mapping.
Identifiers: *USSR, *Caspian Sea, *Arsenic, Balneology, Mineralization.

Arsenic concentrations in deep groundwater of the Middle Caspian artesian basin were determined in Jurassic rocks in Southern Mangyshlak and in Cretaceous strata in the Tersko-Sunzhenskaya zone of Eastern Ciscaucasia. Deep aquifer horizons within the Middle Caspian Basin contain relatively low arsenic concentrations, ranging from 0.01 to 1 mg/liter. On a general regional scale, arsenic content in the basin increases with depth from east to west, though the degree of increase varies locally. Arsenic concentrations in waters of Eastern Ciscaucasia tend to decreases as the chlorine content increases. The arsenic content in deep aquifer horizons of Eastern Ciscaucasia is greater than 0.7 mg/liter and the waters may be classified as therapeutic arsenic-bearing waters. Arsenic concentrations in artesian waters of Eastern Ciscaucasia and Southern Mangyshlak are tabulated. (Josefson-USGS)
W74-10379

RAIOCARBON IN GLACIAL WATER OF THE EL'BRUS REGION (RADIOUGLEROD V LEDNIKOVOY VODE PRIEL'BRUS'YA),
Akademiya Nauk URSR, Kiev. Institut Geokhimii i Fiziki Mineralov.
For primary bibliographic entry see Field 2K.
W74-10380

PROBLEM OF THE ORIGIN OF HYDROGEN SULFIDE IN NATURAL WATERS (K PROBLEME GENEZISA SEROVODORODA PRIRODNYKH VOD),
Ustredni Ustav Geologicky, Brno (Czechoslovakia).
R. Kvet.
Geokhimiya, No 4, p 625-628, April 1973. 17 ref.

Descriptors: *Geochemistry, *Hydrogen sulfide, Groundwater, *Sulfates, *Sulfur bacteria, Aerobic bacteria, Microbiology, Organic matter, Reduction(Chemical), Oxidation, Water pollution sources.
Identifiers: *USSR.

Hydrogen sulfide in natural waters is formed by the presence of sulfates, organic matter, and sulfate-reducing bacteria in a reducing medium and by their contact with oxidizing waters containing aerobic organisms. These organisms form a suitable organic substrate for sulfate-reducing bacteria through conversion of organic matter, unsuitable for direct use by these bacteria. Hydrogen sulfide in groundwater forms in hydrodynamically open structures such as regions of recent faulting of highly permeable rocks, which allow these two water types to come into contact. The presence of hydrogen sulfide in groundwater attests to the contact of an aquifer horizon with waters of the reducing medium and with waters in the zone of aeration. In manmade reservoirs, lakes, seas, and oceans, the formation of hydrogen sulfide and, most likely, the presence of reducing and oxidizing waters are also determined by their rate and direction of flow. (Josefson-USGS)
W74-10381

URANIUM AND SEDIMENTATION IN THE BLACK AND AZOV SEAS (URAN V PROTSESSE OSADKOOBRAZOVANIYA V CHERNOM I AZOVSKOM MORYAKH),
Akademiya Nauk SSSR, Moscow. Institut Okeanologii.
For primary bibliographic entry see Field 2J.
W74-10383

MANAGEMENT OF URBAN STORM RUNOFF,
Water Resources Engineers, Walnut Creek, Calif., and Hydrologic Engineering Center, Davis, Calif.
For primary bibliographic entry see Field 5D.
W74-10395

A MODEL FOR EVALUATING RUNOFF-QUALITY IN METROPOLITAN MASTER PLANNING,
Water Resources Engineers, Walnut Creek, Calif.; Hydrologic Engineering Center, Davis, Calif.; San Francisco City and County Dept. of Public Works, Calif.
For primary bibliographic entry see Field 5D.
W74-10396

SYSTEMATIC DEVELOPMENT OF METHODOLOGIES IN PLANNING URBAN WATER RESOURCES FOR MEDIUM SIZE COMMUNITIES: ECONOMIC AND ENVIRONMENTAL IMPACTS OF SURFACE RUNOFF DISPOSAL SYSTEMS,
Purdue Univ., Lafayette, Ind. Dept. of Agricultural Economics.
For primary bibliographic entry see Field 6A.
W74-10397

POLLUTION ABATEMENT; DISPOSABILITY RATINGS OF PACKAGING MATERIALS USED ABOARD UNITED STATES NAVAL SHIPS,
Naval Ship Research and Development Center, Annapolis, Md. Materials Dept.
For primary bibliographic entry see Field 5G.
W74-10398

FLUSHING AND WATER QUALITY CHARACTERISTICS OF SMALL-BOAT MARINAS,
Washington Univ., Seattle. Dept. of Civil Engineering.
R. E. Nece, and C. R. Knoll.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-234 323, $3.75 in paper copy, $2.25 in microfiche. Completion Report No 40, June 1974. 58 p, 22 fig, 22 ref. OWRR A-064-WASH(2).

Descriptors: *Water pollution sources, *Water quality, Tidal waters, Biology, *Hydraulic models, *Marinas, Recreation facilities, Water temperature, Dissolved oxygen, Nitrates, Chlorophyll, Hydrogen ion concentration, Biomass.
Identifiers: *Tidal flushing.

Tide induced circulation patterns and gross flushing characteristics of two small-boat marinas are compared with field observations of currents and water quality within the marinas. Both marinas had comparable geometries, gross flushing characteristics, and water quality. There was not sufficient difference between the two marinas studied to verify how well small-scale hydraulic models may be used as predictors of overall quality within a particular marina. Water quality parameters sampled and reported for the period June-September, 1973, are temperature, dissolved oxygen, nitrate, pH, and chlorophyll a, the latter used as an index of total biomass in the water column. Comparable data were taken at a lake marina, for comparison between salt and fresh water environments. A sampling procedure is suggested for obtaining standardized descriptions of the quality of water within a marina as compared to the quality of water within a marina as compared to the quality of ambient waters. The suggested approach is conservative, being based on maximum detention times of water within the marinas, and incorporates sampling at that time on the tidal cycle when spatial variations in local exchange and water quality within the marina basin are minimum.
W74-10419

MEASUREMENTS OF THE DISTRIBUTION AND VOLUME OF SEA-SURFACE OIL SPILLS USING MULTIFREQUENCY MICROWAVE RADIOMETRY,
Hulbert (E.O) Center for Space Research, Washington, D.C. Space Sciences Div.
J. P. Hollinger, and R. A. Mennella.
Available from NTIS, Springfield, Va. 22161 as AD-762 753, Price $3.00 printed copy; $2.25 microfiche. Report No 7512, June 5, 1973. 9 p, 5 fig, 1 tab, 8 ref. NRL Problem G01-08.

Descriptors: *Remote sensing, *Microwaves, *Oil spills, Oil pollution, Radar, Aircraft, *Path of Pollutants, Oily water, Water pollution control, Distribution patterns, Pollutant identification.

Detection of oil spills by microwave measurements for aircraft was tested on eight controlled marine oil spills. Over 90 percent of the oil was generally confined in a compact region with thicknesses in excess of 1 mm and comprising less than 10 percent of the area of the visible slick. Microwave radiometry offers a means to measure the distribution of oil in sea-surface slicks and to locate the thick regions and measure their volome on an all-weather, day-or-night, and real-time basis. (Knapp-USGS)
W74-10429

THE FATE OF OIL SPILT AT SEA.
Central Dockyard Lab., Portsmouth (England).
Available from NTIS, Springfield, Va 22161 as AD-763 042, Price $4.50 printed copy; $2.25 microfiche. Ministry of Defense Working Party Report, 1973. 54 p, 4 fig, 7 tab, 58 ref.

Descriptors: *Oil pollution, *Oil spills, *Path of pollutants, Oily water, Evaporation, Oxidation, Biodegradation, Surveys, Bibliographies, Water pollution effects, Water pollution sources.

Oil spilled well away from land can travel great distances and still be a difficult problem when it eventually comes ashore. Methods for the early dispersion of such emulsions, possibly by inversion and progressive dilution, are vital if slicks are to be destroyed at an early stage. Processes which can contribute to the actual destruction or dissipation of an oil slick are evaporation, oxidation, solution, and dispersion as minute droplets. Dissemination of the oil in a finely divided and dilute condition renders it more susceptible to destruction by bacteria and intake by marine life. Loss by evaporation under static conditions at room temperature can range from about 33% for Tia Juana crude, to 36% for Kuwait and over 50% for Brega, while a residual oil fuel is virtually nonvolatile. The greater part of the oil spilled is accounted for by evaporation and by spreading to a thin film, while the remainder is in part dispersed in the water and in part left as an intractable residue. (Knapp-USGS)
W74-10434

MEASUREMENT OF ENVIRONMENTAL POLLUTION AND ITS SYSTEMIZATION,
Hitachi Ltd., Tokyo (Japan).
For primary bibliographic entry see Field 5A.
W74-10438

WASTE NEUTRALIZATION CONTROL - DIGITAL SIMULATION SPOTS NONLINEARITIES,
Cincinnati Univ., Ohio.
For primary bibliographic entry see Field 5D.
W74-10454

TWO SUSPECTS IN TASTE MYSTERY,
Water and Pollution Control, Vol 111, No 12, p 26-28, December, 1973.

Descriptors: *Canada, *Odor, *Taste, *Leachate, Landfills, Industrial wastes, *Aquifers, Streams, Water table, *Recharge, Groundwater.

Identifiers: *Ontario(Canada), Sabiston Well.

The source of noxious odors and a taste in the drinking water at Markham, Ontario, was investigated. The problem appeared to come from the Sabiston Well located 700 ft from an industrial refuse disposal site. Leachate migrating from the landfill was suspected as the cause. The groundwater quality around the site was studied to assess the direction of groundwater movement and determine whether contaminants were moving from the landfill to the wells. The Sabiston and two other wells drew water from a common aquifer which also stretched under the landfill. A stream flows over a portion of the aquifer and apparently recharges the aquifer. There were variances in the groundwater chemistry, particularly in chlorides and hardness. Due to changes in the level of the water table, the stream changed from being effluent to influent in the vicinity of the Sabiston Well. It is concluded that the water quality in the stream could have adversely affected the well. The contaminants could reach, and may have reached, the municipal wells. But the long travel time (estimated 1.4 ft/day) plus numerous variables and uncertainties make it difficult, if not impossible, to connect the landfill conclusively with the reported taste problem. (Merritt-FIRL)
W74-10459

EFFECTS OF ROAD SALT IN WINTER,
Louvain Univ. (Belgium). Public Health Lab.
For primary bibliographic entry see Field 4C.
W74-10460

COMMENT ON WATER POLLUTION IN LAKE MICHIGAN FROM POLLUTION AEROSOL FALLOUT,
Israel Atomic Energy Commission, Beersheba. Nuclear Research Centre-Negev.
D. Skibin.
Water, Air, and Soil Pollution, Vol 2, No 4, p 405-407, December, 1973. 10 ref.

Descriptors: *Air pollution effects, Pollutants, *Water pollution, *Lake Michigan, *Metals, Aluminum, Chromium, Iron, Sulfur, Winds, *Trace elements.

The hypothesis that air pollution is a major source of some water pollution trace elements in Lake Michigan was reexamined. Hazards evaluation techniques were used to assess the overall transfer efficiency of pollution from air to the lake. This efficiency was found to be at least 25% which supports the hypothesis. Four new trace elements were found: aluminum, chromium, sulfur, and iron. It is recommended that the problem be further studied, taking into account local mesoscale systems such as a lake breeze, distribution of air trajectory, and wind speed. (Merritt-FIRL)
W74-10461

2 RIVERS: VIRGINIA'S JAMES AND MARYLAND'S CHESTER.
Central Atlantic Environment Center, Washington, D.C.
Central Atlantic Environment News, Vol 3, No 9 & 10, p 1-12, September-October 1973. 2 map.

Descriptors: *Rivers, *Environmental effects, Dams, Channeling, Erosion, Water pollution , Water pollution sources, Sewage, Sewage disposal, Sewage treatment, Secondary treatment, Industrial wastes, Shellfish, Oysters, Recreation, Siltation, Flood control, Flood plain zoning, Pesticides, Dredging, Estuaries, Run-off, Land use, Land management, *Virginia, *Maryland.
Identifiers: *James River(Va), *Chester River(Md).

Like most rivers, the James River in Virginia carries the wastes of industries and the sewage of cities. But the James and its tributaries are also being extensively dammed, channelized and dredged. The result is massive, frequently shortsighted manipulation which is transforming the river as to degrade its remaining value and beauty. Intensely urbanized Richmond and Tidewater are heavy wastewater polluters of the James. Industrial pollution is another serious problem with more than 280 discharge points along the river's length. High coliform counts have closed much of the estuary to shellfish harvesting and a Corps of Engineers channel dredging project threatens the state's only natural bed for seed oysters. The Chester River in Maryland is likewise besieged by problems. Altered salinity levels, siltation and the presence of dangerous levels of coliform, organic matter, pesticide residues and trace metals all contribute to its degraded condition. Erosion, traditionally caused by wind and waves, has become more serious because farmers are plowing their field completely to the edge of the river bluffs. Unnecessary loss of land degraded water quality caused by turbidity, and silt are some of the penalities of land mismanagement. (Ritchie-Florida)
W74-10503

THE NORTH SEA,
Deutsches Hydrographisches Institut, Hamburg (West Germany).
G. Weichart.
Environment, Vol 16, No 1, p 29-33, January-February 1974. 3 fig, 4 tab, 5 ref.

Descriptors: *Estuaries, *Oceans, *Water pollution sources, *Water pollution, *Water pollution effects, Fallout, Oil wastes, Pollutant identification, Sewage effluents, Water resources, Impaired water quality, Public health, Waste water(Pollution), Waste dilution, Industrial wastes.
Identifiers: *North Sea.

The chemical processes of pollution in the North Sea are discussed. The southern region is more heavily polluted than the northern, mainly because the supply of pollutants in the south is the greatest and the dilution is the lowest, owing to the shallow water depths. An especially high rate of pollution occurs in the river estuaries, many coastal waters, the dumping areas and the principal shipping lanes. The discharge of phosphate and nitrogenous compounds are shown and rough estimates concerning the discharge of heavy metals and metaloids through the Rhine are given. Dumping of industrial wastes is estimated to comprise between 10 to 20% of the total pollution. Active shipping traffic is also a major problem as practically all their wastes are deposited without any treatment. The elimination of pollutants through watermass exchange with the Atlantic and natural reactions with bacterial decomposition is also discussed. (Sutton-Florida)
W74-10513

ACTIVATED SLUDGE - BIO-DISC TREATMENT OF DISTILLERY WASTEWATER,
American Distilling Co., Pekin, Ill.
For primary bibliographic entry see Field 5D.
W74-10525

A PREDICTIVE MODEL FOR SLUDGE CHARACTERIZATION USEFUL TO DESIGN AND CONTROL OF SLUDGE DEWATERING PROCESSES IN WATER RECYCLE SYSTEMS,
Maine Univ., Orono. Dept. of Chemical Engineering.
For primary bibliographic entry see Field 5D.
W74-10528

RECONNAISSANCE OF THE FLUSHING CHARACTERISTICS AND WATER QUALITY IN COASTAL CANALS OF THE GULF OF MEXICO,
University Southern Mississippi, Hattieburg.
O. L. Paulson, Jr., G. F. Pessoney, L. Massey, and D. Weaver.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-234 430, $3.00 in paper copy, $2.25 in microfiche. Mississippi Water Research Institute, Mississippi State, Completion Report, July 1974. 21 p, 2 fig, 4 tab, 22 ref. OWRR A-078-MISS(1).

Descriptors: *Canals, Water pollution, Marine biology, Canal design, *Water quality, *Gulf of Mexico, Regulation, *Dissolved oxygen, Florida, Texas, *Mississippi, Canal construction.
Identifiers: *Coastal canals, *Residential canals, *Flushing, *Pass Christian Isles(Miss).

The construction of residential canals, many of which are dead-end canals, in a coastal strip along the Gulf of Mexico has been the subject of great concern by regulatory agencies in the United States. The major concern is that construction of these canals may lead to degradation of water quality to the point where they are void of plant and animal life or that such developments result in the destruction of valuable nursery grounds for a number of organisms in the food chain of aquatic life. Discussions with numerous regulatory agencies in Florida and Texas, access to a limited number of published and unpublished reports, and the results of sampling during this investigation indicate that unfavorable conditions may develop because of the manner in which residential canals are constructed. It appears to be common practice to construct canals with a shallow area about midpoint of the canal, which results in a sink at the head or dead-end of the canal. This practice is thought to be largely responsible for the low dissolved oxygen measurements at those sites. Dissolved oxygen on the bottom at the head of three of the four canals sampled was from 2.0 to 3.0 mg/l. The only pattern observed for plankton and meiofauna was much larger numbers at the most saline of the four canal systems and smallest numbers at the freshest canal system.
W74-10531

MACROBENTHOS AS INDICATORS OF ECOLOGICAL CHANGE,
Lamar Univ., Beaumont, Tex. Dept. of Biology.
R. C. Harrel, J. Ashcraft, R. Howard, M. Welch, and R. Russell.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-234 424, $3.75 in paper copy, $2.25 in microfiche. Completion Report, October 1973, 58 p, 6 fig, 4 tab, 32 ref. OWRR B-106-TEX(1). 14-31-0001-3655.

Descriptors: *Benthos, Impoundments, Path of pollutants, Salt water intrusion, Navigation, *Texas, *Clams, *Bioindicators, *Ecological distribution, Water pollution effects, Pollutant identification, Distribution patterns.
Identifiers: *Neches River(Tex), Rangia cuneata, *Ecological change, *Diversity indices.

The objective was to correlate community structure of benthic macroinvertebrate with ecological changes in a 30 mile section of the lower Neches River, Texas. The resulting information can be used to predict ecological effects of river basin development and serve as a reference for future studies. Physico-chemical conditions were measured according to standard methods; total oxygen demand was determined with an Ionic Total Oxygen Demand Analyzer. Macrobenthos were collected by dredge and artificial substrate samplers; community structure was determined in terms of numbers of species and individuals, indicator organisms, and diversity indices. The approximate area of the river inhabited by Rangia cuneata was 27.4 hectares (59.32 acres), with an average density of 220/m squared. The potential value of Rangia production in the Neches River and Pine Island Bayou is $39,744.00 annually for shell and meat. Hindering development of a Rangia fisheries is the presence of pollution in the clam producing area. The complex interaction of physical and chemical parameters, and industrial effluents in a changing salinity environment made it difficult to define

species which were good indicators of ecological change in the Neches River.
W74-10534

NTA AND MERCURY IN ARTIFICIAL STREAM SYSTEMS,
Georgia Univ., Athens. Inst. of Ecology.
H. J. Kania, and R. J. Beyers.
Copy Available from GPO Sup Doc as EP1.23:660/3-73-025, $0.70; microfiche from NTIS, Springfield, Va 22161 as PB-234 459, $2.25. Environmental Protection Agency, Ecological Research Series, Report EPA-660/3-73-025, February 1974. 25 p, 12 fig, 1 tab, 6 ref. EPA Program Element IBA023, Project 16050 GQQ.

Descriptors: *Heavy metals, Phosphates, Environmental effects, *Detergents, *Nitrolotriacetic acid, *Mercury, *Path of pollutants, Biodegradation, Water pollution effects.
Identifiers: *Artificial stream channels, Mosquitofish, Gambusia affinis.

Studies were conducted in six artificial stream channels to determine the fate of NTA (nitrilotriacetic acid, trisodium salt) added with and without sodium phosphate to these systems. In the two hour period required for a given water mass to traverse the channels, there was no appreciable amount of NTA or phosphate, even after a one month period of continuous input. Visible biological differences were noted between the various treatments. These differences may have been a result of pH alteration caused by the addition of the trisodium phosphate and NTA. In anticipation of a long term program involving the fate of mercury and possible mercury-NTA interactions, several modifications were incorporated into the artificial stream system. Based on the results of laboratory studies, a mercury removal system utilizing shredded rubber tires as obtained from commercial tire recapping firms, was constructed. Laboratory studies indicated that NTA did not influence the uptake of mercuric ion by the rubber. The presence of NTA did alter the uptake pattern and final concentration by mosquitofish, Gambusia affinis. (EPA)
W74-10538

LOW WINTER DISSOLVED OXYGEN IN SOME ALASKAN RIVERS,
Environmental Protection Agency, College, Alaska. Arctic Environmental Research Lab.
E. W. Schallock, and F. B. Lotspeich.
Copy Available from GPO Sup Doc as EP1.23:660/3-74-008, $0.85; microfiche from NTIS, Springfield, Va 22161 as PB-234 443, $2.25. Ecological Research Series Report EPA-660/3-74-008, April 1974. 33 p, 11 fig, 3 tab, 36 ref. EPA Project 21ARX, Program Element IBA021.

Descriptors: *Dissolved oxygen, *Alaska, Rivers, Winter, Seasonal, *Conductivity, *Alkalinity, *Hydrogen ion concentration, *Water temperature, Water quality standards, Arctic, Subarctic.
Identifiers: Yukon River(Alas), Chena River(Alas), Sagavanirktok River(Alas).

Water samples collected during the years 1969 through 1972, from 36 selected Alaskan rivers were analyzed for dissolved oxygen, pH, conductivity and alkalinity. Dissolved oxygen (D.O.) ranged from 0.0 to 15.3 ml/l (106 percent saturation); pH from 6.2 to 8.4; conductivity varied from 105 to 3000 (umho/cm); and alkalinity from 28 to 410 (mg/l). Severe D.O. depletion during winter was found in many river systems large and small, and located in a range of latitudes (70 deg N to 61 deg N). Sufficient data were collected on the Chena, Chatanika, and Salcha Rivers to reveal annual D.O. trends: near saturation during spring 'breakup' and fall 'freezeup' when water temperatures are near 0 deg C; somewhat lower D.O. concentrations during warm water summer periods; and yearly minimum concentrations during the winter (January-March) interval. Data indicate that D.O. depression begins in October and continues into February. D.O. from stations near the mouth of a river were generally depressed more than at upper stations. The latter trend was observed in the Ukon River which contained 10.5 mg/l (73 percent saturation) at the Canadian Border but only 1.9 mg/l (13 percent) near the mouth. pH gradually decreased in some rivers although alkalinity and conductivity increased. The depressed winter D.O. concentrations and low winter discharge in many Alaskan rivers are more severe and widespread than present literature indicates. Winter conditions may already limit aquatic organisms in some systems. (EPA)
W74-10546

SANITARY LANDFILL THREATENS LAKE.
Water and Pollution Control, Vol 112, No 3, p 12, March 1974.

Descriptors: *Landfills, *Lakes, *Damages, Erosion, Runoff, *Canada.
Identifiers: Berm, *Black Lake(Canada), *Dartmouth(Canada).

The threat of the sanitary landfill operation of Dartmouth to Black Lake is discussed. The landfill could destroy the lake if the landfill is allowed to continue without safeguards according to the Dartmouth Lakes Advisory Board (DLAB). The landfill is located in an area slated to have industries situated there in the future. The landfill operation is heading rapidly towards the lake and could soon be spilling into it unless protective measures are taken. There are plans to build an earth berm at the bottom of the mound of landfill, designed to protect the lake, but members of the DLAB do not think that will be sufficient. There is evidence that some erosion is taking place and if the berm is made of raw earth, soil runoff would occur in heavy rains. (Merritt-FIRL)
W74-10553

NO RADIOACTIVE FISH IN LAKE MICHIGAN.
For primary bibliographic entry see Field 5C.
W74-10561

STUDY OF CARBOHYDRATE SOLUBILIZATION FROM SEWAGE SLUDGES,
Holywell R. D. C. (Wales).
For primary bibliographic entry see Field 5D.
W74-10562

PROCESS INNOVATIONS.
For primary bibliographic entry see Field 5A.
W74-10605

THE HYDROLYSIS OF UREA IN RIVERS,
Water Pollution Research Lab., Stevenage (England).
M. J. Stiff, and D. K. Gardiner.
Water Treatment and Examination, Vol 22, No 4, p 259-268, 1973. 4 fig, 3 tab, 4 ref.

Descriptors: *Winter, *Ureas, Rivers, Laboratory tests, On-site investigations, Ice, *Hydrolysis, *Water pollution sources.
Identifiers: *United Kingdom, Airports.

Laboratory and field tests were conducted to establish whether the hydrolysis of urea might occur in rivers during winter conditions when urea would be used to prevent the formation of ice on airfield runways. The results show there is a likelihood that the hydrolysis of urea will take place in rivers in winter time. The rate of hydrolysis appears to depend on local conditions and at present not enough is known about the appropriate variables to make any generalization. Therefore, the rate at which hydrolysis would occur in any particular river can be estimated only by experiments involving the water and bottom deposits of that river. Because of the relatively short residence time of rivers in the United Kingdom it is unlikely that complete hydrolysis of urea will take place, in which case the urea nitrogen load would not appear as ammonia at waterworks intakes. Further hydrolysis could occur during residence in reservoirs, but quantification is possible only by examination of particular cases. In river waters examined there is invariably a measurable concentration of urea ranging from 0.01 to 1 mg N/liter. The addition of urea to rivers from airfields will not therefore introduce any substance foreign to river waters although it could lead to an unusually high concentration. (Merritt-FIRL)
W74-10608

TRITIUM WATER TRACING,
Atomic Energy Research Establishment, Harwell (England).
D. B. Smith.
Water Treatment and Examination, Vol 22, No 4, p 250-258, 1973. 2 fig, 4 ref.

Descriptors: *Tritium, *Analytical techniques, *Radioactivity techniques, *Radiochemical analysis, *Tracers, Rivers, Recharge, Mining, Mine drainage, Water pollution sources, Groundwater movement.

Tritium tracing techniques are a valuable tool for groundwater investigations. These techniques are reliable, practical, and complentary to other methods. Unique information about relatively long-term movement and the behavior of pollutants can be gathered from natural tritium measurements. Examples of tritium tracer studies are given for drainage of water from mines and for a river recharge investigation. (Murphy-FIRL)
W74-10615

MARITIME ACCIDENTAL SPILL RISK ANALYSIS: PHASE I: METHODOLOGY DEVELOPMENT AND PLANNING,
Operations Research, Inc., Silver Spring, Md.
R. M. Fortson, Jr., E. L. Holmboe, F. B. Brown, J. T. Kirkland, and P. M. Tullier.
Available from NTIS, Springfield, Va 22161 as AD-761 362 Price $5.45 printed copy; $2.25 microfiche. Technical Report 753 for U S Coast Guard, January 1973. 71 p, 18 fig, 10 tab, 7 append. DOT-CG-22, 326-A.

Descriptors: *Oil spills, *Channels, *Navigation, Water pollution control, Safety, Risks, Alternate planning.

A methodological approach and task plan is given for assessing alternative methods of reducing the potential risk caused by the spill of hazardous cargo as the result of vessel collisions and groundings. In addition to developing the overall study approach, preliminary analysis of ship and barge accidents in U.S. territoral waters and ports identifies types of accidents. A practical risk management system for the Coast Guard's role in Merchant Marine safety is the goal of this study. (Knapp-USGS)
W74-10619

IMPACT OF URBANIZATION ON QUALITY OF RIVER WATER (VLIYANIYE URBANIZATSII NA KACHESTVO RECHNYKH VOD),
Gosudarstvennyi Gidrologicheskii Institut, Leningrad (USSR).
B. G. Skakal'skiy.
In: Voprosy vliyaniya khozyaystvennoy deyatel'nosti na vodnyye resursy i vodnyy rezhim; Gosudarstvennyy Gidrologicheskiy Institut Trudy, No 206, p 134-145, Leningrad, 1973. 4 fig, 4 tab, 28 ref.

Descriptors: *Urban sociology, *Urbanization, *Water quality, *Surface waters, *Cities, Urban runoff, Precipitation(Atmospheric), Wastes, Industrial wastes, Domestic wastes, Pollutants, Water pollution, Chemical oxygen demand,

Biochemical oxygen demand, Water chemistry, Foreign research.
Identifiers: *USSR.

The proportion of urban population in the USSR increased from 48% in 1959 to 56% in 1970. Particularly noteworthy are the high rates of urbanization in such remote areas as Siberia and Kazakhstan and the rapid growth of large cities. By 1970, 221 cities had a population of over 100,000, and 11 cities had a population of over 1,000,000. Some aspects of the effects of urbanization on the chemical quality of natural surface waters are examined on the basis of Soviet and foreign investigations. The impact of an urban area on the quality of natural water is determined mainly by (1) discharge of urban industrial wastes; (2) discharge of domestic wastes and fecal waters; (3) contamination of atmospheric precipitation; and (4) contamination of surface runoff from an urban area. Changes in chemical quality of water bodies as a result of discharge of urban wastes are evaluated. (See also W74-10626) (Josefson-USGS)
W74-10632

ATS AMARGOSA TRACER STUDY - PROGRAM MANUAL,
Computer Sciences Corp., Las Vegas, Nev. Scientific Systems Dept.
A. P. Coston.
Available from NTIS, Springfield, Va. 22161 as NVO-412-1, Price $4.00 printed copy; $2.25 microfiche. Contract Report NVO-412-1, May 1973. 36 p. USAEC Contract AT(26-1)-412.

Descriptors: *Computer programs, *Tracers, *Path of pollutants, *Statistical methods, *Data processing, Statistics, Hydrologic data.

Using hydrologic data in card form, program ATS (Amargosa Tracer Study) reads the data and lists it in standard STATPAC format on tape. The STATPAC tape so created may consist of one or more data sets. The tape contains the concentrations of tritium, sodium, chloride, Rhodamine WT and specific conductance; date and time at which these concentrations were measured; normalized concentrations; floating point time; and the cumulative discharge for each set. The cumulative pumping discharge is calculated by obtaining the product of the pumping rate and the difference between the times the pump was turned on and off. The discharge is then plotted against Rhodamine WT, tritium, sodium, chloride, and specific conductance with the results output on microfilm. In the event there are two or more rates of discharge and two or more starting times, ATS provides overlay plots; cumulative discharge for each sample at each pumping rate is plotted against the various concentrations. Only normalized values of Rhodamine WT, tritium, sodium, chloride, and specific conductance are plotted. (Knapp-USGS)
W74-10638

ADSORPTION OF PHOSPHORUS BY LAKE SEDIMENT,
New Hampshire Univ., Durham.
For primary bibliographic entry see Field 5C.
W74-10642

TIME OF TRAVEL OF SOLUTES IN MISSISSIPPI RIVER FROM BATON ROUGE TO POINTE A LA HACHE, LOUISIANA,
Geological Survey, Baton Rouge, La.
L. A. Martens.
Louisiana Department of Public Works, Baton Rouge, Water Resources Technical Report No 9, 1974. 1 sheet, 7 fig, 2 ref.

Descriptors: *Tracers, *Path of pollutants, *Mississippi River, *Dispersion, *Mixing, Travel time, Solutes, Dye releases, Fluorescent dye, Streamflow, *Louisiana.

A water tracer was injected into the Mississippi River at Baton Rouge, La., in order to determine the travel times, the maximum concentrations, the dispersion characteristics, and the duration of the tracer cloud as it moved downstream past New Orleans, La. This study (1974) was made when the Mississippi River at Baton Rouge was approaching flood discharge with a stage of 31 feet and discharge of 800,000 cfs. Accidental spills on the lower Mississippi River occur most often as a result of navigation accidents; these incidents occur most often during periods of high flow. Therefore, it is under these circumstances that the behavior of solutes accidentally spilled into the river should be known. For higher discharges the relation between travel time and distance is essentially linear; however, because of tidal influence at lower discharges this relation becomes curvilinear. At Addis, 4 miles downstream from the injection point, the tracer had dispersed toward both banks and the cloud was approximately 1,400 feet wide. The water tracer had moved to within 400 feet of the left bank and to within 1,000 feet of the right bank. As the tracer moved through the first meander, at Longwood, 9 miles downstream, concentrations were greatest about 500 to 1,000 feet from the right bank. At Burtville, 16 miles downstream, concentrations were again highest near the center of the river. Vertical mixing was not complete at Addis; however, by the time the tracer had moved to Longwood and Burtville, concentrations at surface and depth were practically the same at each location. At New Orleans, after a travel time of 41 hours, the passage time (or the longitudinal dispersion) was 8 hours. (Knapp-USGS)
W74-10646

ONE-DIMENSIONAL ANALYSIS OF HEAT DISSIPATION IN A SIDEARM OF A COOLING LAKE,
Oak Ridge National Lab., Oak Ridge, Tenn.
L. Dresner.
Available from NTIS, Springfield, Va 22161 as ONRL-TM-4287 Price $3.25 printed copy; $2.25 microfiche. Report ORNL-TM-4287, October 1973. 19 p, 4 fig, 3 ref, append. AEC Contract W-7405-eng-26.

Descriptors: *Path of pollutants, *Thermal pollution, *Lakes, *Numerical analysis, *Computer programs, Water circulation, Heat budget, Heat transfer, Water temperature.

A simple one-dimensional theory was formulated to describe surface cooling in blind sidearms of cooling lakes. The theory is based on an extension of Schijf and Schonfeld's equations of motion for the steady, nonuniform flow of the two-layered system. A numerical program to facilitate the computations is listed and illustrative results are given. (Knapp-USGS)
W74-10651

CHEMICAL DATA FROM OREGON WATERS, 1972,
Oregon State Univ., Corvallis. School of Oceanography.
R. D. Tomlinson, L. Barstow, D. R. Standley, S. Williams, and L. I. Gordon.
Available from NTIS, Springfield, Va 22161 as AD-775 250. Price $4.75 printed copy; $2.25 microfiche. Data Report 56 (Reference 73-15), September 1973. 119 p, 3 tab, 22 ref. ONR Contract N00014-67-A-0369-0007.

Descriptors: *Nutrients, *Sea water, *Water chemistry, *Oregon, Sampling, Maps, Phosphates, Nitrates, Silica, Water temperature, Dissolved oxygen, Salinity, *Data collections.

Water chemistry data collected on six cruises made during the months May-October 1972 along the Oregon coast are presented as complete data listings and sequential surface data contour charts. The charts graphically display rapid changes in surface water characteristics on time scales as short as a few hours. The data collected are the concentrations of water temperature, dissolved oxygen, PO4, NO3, NO2, H4SiO4, and CO2. Each surface contour plot is presented with a corresponding chart giving sample locations. (Knapp-USGS)
W74-10652

OCEAN WASTE DISPOSAL IN THE NEW YORK BIGHT,
Interstate Electronics Corp., Anaheim, Calif. Oceanics Div.
T. J. Achrem.
Available from NTIS, Springfield, Va 22161 as PB-224 983 Price $4.50 printed copy; $2.25 microfiche. Report 4460C1559, August 1973. 119 p, 10 fig, 6 tab, 53 ref. EPA Contract 68-01-0796.

Descriptors: *Waste disposal, New York, *Garbage dumps, Municipal wastes, *Sludge disposal, Water pollution sources, Regulation, Water pollution control, Water pollution effects, Estuaries.
Identifiers: *New York Bight.

Criteria are given for the control of ocean waste disposal in the New York Bight. An intensive field survey was conducted in the New York city metropolitan region during the spring of 1973. The topics surveyed include ocean dump site characteristics, their geographic location, type and volume of material dumped, method of disposal, description of disposal sites, monitoring procedures, local regulating agencies, estuarine economics, an extensive chronology of related major events, and alternatives and recommendations for ocean disposal in the New York Bight. (Knapp-USGS)
W74-10655

A PRELIMINARY ASSESSMENT OF THE ENVIRONMENTAL VULNERABILITY OF MACHIAS BAY, MAINE TO OIL SUPERTANKERS,
Massachusetts Inst. of Tech., Cambridge.
For primary bibliographic entry see Field 5C.
W74-10656

PRELIMINARY STUDY OF THE QUALITY OF WATER IN THE DRAINAGE AREA OF THE JEMEZ RIVER AND RIO GUADALUPE,
Los Alamos Scientific Lab., N. Mex.
W. D. Purtyman, F. G. West, and W. H. Adams.
Available from NTIS, Springfield, Va 22161 as LA-5595-MS Price $4.00 printed copy; $2.25 microfiche. Informal Report LA-5595-MS, California University, April 1974. 26 p, 2 fig, 10 tab, 12 ref.

Descriptors: *Water quality, *New Mexico, *Geothermal studies, Water pollution sources, Surface waters, Groundwater, Test wells, Boreholes, Water chemistry, Basic data collections, Hydrologic data.
Identifiers: *Jemez River(N. Mex.), *Rio Guadalupe(N. Mex).

A preliminary study of the quality of surface waters and groundwater was made in the area of a proposed geothermal test hole in New Mexico. The study was made to establish background data prior to the geothermal experiment. Analyses are reported from 17 surface water stations, 15 mineral and thermal springs, and 53 groundwater stations (wells, test holes, and springs). A general description of sampling stations is presented with a brief description of the chemical quality of the water based on concentrations of dissolved solids. (Knapp-USGS)
W74-10658

MISSOURI RIVER HYDROLOGY (STREAMFLOW AND TEMPERATURE)--SIOUX CITY, IOWA TO RULO, NEBRASKA,
Battelle-Pacific Northwest Lab., Richland, Wash.
For primary bibliographic entry see Field 2E.
W74-10659

DIFFUSION-INDUCED INSTABILITY IN MODEL ECOSYSTEMS: ANOTHER POSSIBLE EXPLANATION OF PATCHINESS,
Johns Hopkins Univ., Baltimore. Chesapeake Bay Inst.
A. Okubo.
Technical Report 86, (Reference 74-3), May 1974. 17 p, 1 fig, 18 ref.

Descriptors: *Diffusion, *Ecosystems, *Distribution patterns, Biological communities, Ecological distribution, Dispersion, Niches, Model studies.
Identifiers: Patchiness.

Because a diffusion process in an ecosystem tends to give rise to a uniform density of population in space, diffusion usually plays a general role of increasing the stability in a system of mixed populations and resources. However, diffusion may also induce an instability to a system which is basically stable without diffusion. Thus a system of two interacting and diffusing populations both being coexistent in a spatially uniform distribution, hence with no patterns, may exhibit an interaction-diffusion instability. The instability results in a form of biological waves in space and time, thus leading to a 'patchiness.' (Knapp-USGS)
W74-10662

THE STRANGE WORLD OF MISCIBLE DISPLACEMENT,
Louisiana State Univ., Baton Rouge. Dept. of Civil Engineering.
R. G. Kazman, O. K. Kimbler, and W. R. Whitehead.
Preprint 2152, American Society of Civil Engineers, National Meeting on Water Resources Engineering, January 21-25, 1974, Los Angeles, Calif. 15 p, 8 fig, 15 ref. OWRR A-022-LA(1) and A-027-LA(2).

Descriptors: *Waste disposal wells, *Injection wells, *Hydrogeology, *Computer programs, Path of pollutants, Monitoring, Waste disposal, Waste water disposal, Saline water.

The injection of wastes into deep aquifers that are presently filled with saline water is a technically feasible method of long term removal of wastes from the surface environment. Accepted procedures now in use for the construction of waste injection wells are satisfactory. Waste injection projects should be based on adequate knowledge of the regional geology of the target aquifer: thickness, dip, faults that obstruct regional flow, and the density or density distribution of the native fluid in addition to porosity, permeability and storativity. A system of monitor wells can be devised so that the waste can be tracked and managed--measures can be taken to prevent the waste from reaching the biosphere. Computational procedures can yield the required information for the proper placement of wells for monitoring in specific hydrogeologic circumstances: when there is little or no pre-existing groundwater flow and the aquifer dip is small or negligible, and when the aquifer is horizontal and there is groundwater flow. (Knapp-USGS)
W74-10664

ALKALI AND ALKALINE EARTH METALS: DISTRIBUTION AND LOSS IN A HIGH SIERRA NEVADA WATERSHED,
California Inst. of Tech., Pasadena. Div. of Geological and Planetary Sciences.
For primary bibliographic entry see Field 2K.
W74-10667

HYDROLOGY OF LAKE TARPON NEAR TARPON SPRINGS, FLORIDA,
Geological Survey, Tallahassee, Fla.
For primary bibliographic entry see Field 2H.
W74-10673

SIMPLE METHOD FOR PREDICTING DISPERSION IN STREAMS,
Geological Survey, Bay Saint Louis, Miss.
R. S. McQuivey, and T. N. Keefer.
ASCE Proceedings, Journal of the Environmental Engineering Division, Vol 100, No EE4, Paper 10708, p 997-1011, August 1974. 5 fig, 1 tab, 16 ref, append.

Descriptors: *Dispersion, *Open channel flow, *Mixing, *Path of pollutants, Hydraulics, Rivers, Streams, Tracers, Mass transfer, Advection, Momentum transfer, Turbulent flow.

A simple method is given for predicting longitudinal dispersion coefficients from mean flow parameters. An analogy was used between the liinear one-dimensional flow equation and the linear one-dimensional dispersion equation to define a relation between the solute dispersion coefficient and the flow dispersion coefficient. The flow dispersion coefficient is calculated from mean flow parameters, thus allowing predictions of solute dispersion one the relation between the two is known. Dispersion coefficients calculated by the simple method were compared with observed values for 18 streams that cover a wide range in flow conditions. Standard error of estimate is 30%. (Knapp-USGS)
W74-10676

LITERATURE REVIEW ON RESEARCH STUDY FOR THE DEVELOPMENT OF DREDGED MATERIAL DISPOSAL CRITERIA,
Texas Univ., Dallas. Inst. for Environmental Studies.
G. F. Lee, and R. H. Plumb.
Army Engineer Waterways Experiment Station Contract Report D-74-1, June 1974. 145 p, 1 fig, 15 tab, 163 ref.

Descriptors: *Dredging, *Water pollution sources, Pollutant identification, *Waste disposal, Spoil banks, Bottom sediments, Laboratory tests, Water analysis, Water pollution control, *Path of pollutants, *Reviews.
Identifiers: *Dredging wastes.

A review of the literature on the release of chemical contaminants from dredged material and natural water sediment shows that the bulk chemical composition is not a useful index of potential environmental quality problems for waters that come in contact with the sediment. Chemical constituents exist in sediment in a wide variety of forms, many of which are not available to aquatic organisms. In addition, for deposited sediment, the primary factor often controlling contaminant release is the mixing or degree of agitation of the sediment with the overlying waters. A standard elutriate test could be used to detect potential water-column quality problems at the dredging and disposal sites. This test involves the mixing of one volume of the sediment which is to be dredged with four volumes of the disposal site water for a 30-min shaking period. A 1-hour settling period followed by appropriate filtration or centrifugation is used to determine the release of potentially significant chemical constituents from the sediment. A wide variety of factors could affect the results of the elutriate test. These factors include: solid-liquid ratio, time of contact, pH, dissolved oxygen concentration, agitation, particle size, handling of solids, characteristics of water and sediment, and solid-liquid separation. The standard elutriate test requires that if at any time the soluble chemical constituents of selected contaminants in the elutriate exceed 1.5 times the ambient concentration in the disposal site water, special conditions will govern the disposal of this dredged material. (Knapp-USGS)
W74-10686

MERCURY DYNAMICS IN A WARM WATER STREAM,
Michigan State Univ., East Lansing. Dept. of Fisheries and Wildlife.
K. L. Bainbridge, F. M. D'Itri, and T. G. Bahr.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-234 545, $4.00 in paper copy, $2.25 in microfiche. Institute of Water Research, Michigan State University, East Lansing, Technical Report No. 39, November, 1973. 71 p, 3 fig, 8 tab, 56 ref, 3 append. OWRR A-051-MICH(3). 14-31-0001-3222.

Descriptors: *Mercury, Streams, Sediments, Fish, Crayfish, Benthos, Sewage, *Michigan, *Spectrophotometry, Treatment facilities, Pollutant identification, Water pollution sources, *Path of pollutants.
Identifiers: *Flameless atomic adsorption, *Red Cedar River(Mich).

Sediments, fish, crayfish, benthos, and water from the Red Cedar River were collected periodically from a well-defined reach of the river and analyzed for mercury using flameless atomic adsorption methods. Samples of sewage were taken from the East Lansing Sewage Treatment Plant and analyzed to determine the amount of mercury contamination to the river from this source. Levels of mercury in the sediments ranged from 0.04 ppm (dry weight) at the upstream sample site to 0.40 ppm at the downstream sample site. It was estimated that an average of 64.5 grams per day were being carried into the East Lansing Sewage Treatment Plant while an average 17.9 grams per day of this mercury were entering the Red Cedar River at the sewage treatment plant outfall. There was no evidence to suggest that mercury was entering the Red Cedar River from the Red Cedar Golf Course. Levels of mercury in fish ranged from 0.17 ppm (wet weight) to 0.72 ppm. Predator species of fish contained significantly higher concentrations of mercury in their flesh than grazers or bottom feeding omnivores species of fish.
W74-10692

THERMAL POLLUTION--A GROWING CONCERN,
Michigan Dept. of Natural Resources, Lansing.
For primary bibliographic entry see Field 5G.
W74-10698

TEST OF A NEW MODEL FOR THE KINETICS OF ADSORPTION-DESORPTION PROCESSES,
Utah State Univ., Logan. Dept. of Soils and Biometeorology.
For primary bibliographic entry see Field 5G.
W74-10742

THE WATERS OF MEROM: A STUDY OF LAKE HULEH. III. THE MAJOR CHEMICAL CONSTITUENTS OF A 54 M. CORE,
Yale Univ., New Haven, Conn. Osborn Memorial Labs.
For primary bibliographic entry see Field 2H.
W74-10763

OIL SPILLS, HAZARDOUS MATERIALS SPILLS, VESSEL PROTECTION, AND OCEAN DUMPING,
Edison Water Quality Lab., N.J.
For primary bibliographic entry see Field 5G.
W74-10772

SURFACE RUNOFF LOSSES OF SOLUBLE NITROGEN AND PHOSPHORUS UNDER TWO SYSTEMS OF SOIL MANAGEMENT,
Cornell Univ., Ithaca, N.Y. Dept. of Agronomy.
S. D. Klausner, P. J. Zwerman, and D. F. Ellis.

Journal of Environmental Quality, Vol 3, No 1, p 42-46, 1974. 4 fig, 4 tab, 15 ref. WP-01493-011 and 13020 DBP.

Descriptors: *Agricultural runoff, *Nitrogen, *Phosphorus, *Soil management, Nutrients, Agriculture, Rainfall-runoff relationships, Crops, Fertilization, Eutrophication, Rotation, *New York.
Identifiers: Aurora(New York).

Annual loss of soluble nitrogen and inorganic phosphorus from field plots, due to rainfall, was determined. Influence of a crop rotation, soil management practices and fertilizer rates was evaluated. The experimental area is composed of approximately 12 ha of a Lima-Kendaia soil association. The soil texture is silt loam and is moderately to somewhat poorly drained. A three-year crop rotation of corn, beans, and wheat were combined factorially with two levels of fertility and two soil management schemes and replicated twice. The crop rotation has persisted for 15 years and has gone through five cycles. The soil management variable had remained the same for each plot during this period. The data present the annual losses of soluble N and P in the liquid fraction of surface runoff, as a function of past soil management practices and present fertility levels. Mean annual surface runoff volumes were approximately twice as high from poorly managed soils than from well-managed soils. Except for heavy fall fertilization of N on poorly managed soils, total yearly accumulative N discharge in surface runoff did not exceed amount delivered in rainfall as measured over 10 months. Phosphorus losses exceeded the amount contained in rainfall. (Jones-Wisconsin)
W74-10789

METABOLIC CYCLES FOR TOXIC ELEMENTS IN AQUEOUS SYSTEMS,
Minnesota Univ., St. Paul. Freshwater Biological Research Foundation.
For primary bibliographic entry see Field 5C.
W74-10791

EXPERIMENTAL INVESTIGATIONS, AT LABORATORY (SIC), ON THE TRANSFER OF MERCURY OF MARINE TROPHIC CHAINS,
Centre d'Etudes et de Recherches de Biologie et d'Oceanographie Medicale, Nice (France).
For primary bibliographic entry see Field 5C.
W74-10792

MARINE POLLUTION BY METALS AND THEIR ACCUMULATION BY BIOLOGICAL INDICATORS (ACCUMULATION FACTOR),
Trieste Univ. (Italy). Inst. of Hygiene.
For primary bibliographic entry see Field 5C.
W74-10793

MARINE POLLUTION BY HYDROCARBONS IN THE NORTHERN ADRIATIC SEA,
Trieste Univ. (Italy). Inst. of Hygiene.
L. Majori, F. Petronio, G. Nedoclan, and A. Barbieri.
Revue Internationale d'Oceanographie Medicale, Vol 31-32, p 137-169, 1973. 16 fig, 5 tab, 4 ref.

Descriptors: *Oceans, *Oil pollution, *Measurement, Sampling, Surface water, Distribution, Organic compounds.
Identifiers: *Hydrocarbons, *Adriatic Sea(Gulf of Trieste).

A method of measuring hydrocarbons on marine surface water is described. The method consists of sampling by a special funnel, extraction by hexane of the lipidic substance of the sample, quantitative measurement by thin layer chromatography of hydrocarbon in the extract, and elementary percentage analysis of carbon and hydrogen in the extracts. The results obtained by this method in the Gulf of Trieste during two surveys with a total of 700 samples in approximately 150 zones show a differential distribution of oil byproducts that is reproducible to a considerable extent, symmetrical in the log scale of pollution, and has a modal value of 2 kg/sq km, which is associated with an invisible layer. The pollution is visible on only 10% of the marine surface on which it exceeds 30 kg/sq km; rarely does it exceed this value. The reproducibility observed in the local distribution justifies the hypothesis that marine surface pollution by persistent hydrocarbons depends more on space than on time and leads to an almost stationary distribution which can be correlated with the prevailing persistence of pollution sources in the marine environment. The described method has sensitivity and accuracy, and is economically attractive. (Auen-Wisconsin)
W74-10794

DIEL OVERTURNING IN LAKES,
CH2M/Hill Redding, Calif.
S. L. Smith, and D. A. Bella.
Mimeograph, (1972). 27 p, 9 fig, 2 append, 15 ref. 3T2-WP-187-0351.

Descriptors: *Convection, *Diurnal, *Turnovers, *Heat transfer, Depth, Heat budget, Winds, Mixing.
Identifiers: *Diel overturn.

Effect of diel heating and cooling processes upon depth of diel overturn in lakes was investigated by application of a short term heat budget analysis during cooling periods and graphical determination of overturn depths. This approach attempted to determine quantitatively the significance of convective processes to the depth of diel overturn. Qualitative consideration was also given to effects of wind action and thermal gradients in the upper metalimnion. Because various algae exhibit different sinking velocities, depth of diel overturn in stratified lakes could play an important role in determining the predominant algal species. Diel temperature variations show that during the first half of the summer the diel overturn depths range from about 1.5 to 2.4 m. On the basis of a heat budget analysis, diel overturn depths due to convective mixing were found to range from 1.4 to 2.3 m. An examination of the wind effect upon the net heat loss during the nocturnal cooling period revealed that increased heat loss due to increased winds could have a significant effect upon the depth of the overturn. The influence of convection and wind mixing were dependent upon the stability of the upper metalimnion. (Jones-Wisconsin)
W74-10797

PHOSPHATES IN SEDIMENTS OF PAMLICO ESTUARY,
North Carolina Univ., Chapel Hill. Dept. of Environmental Sciences and Engineering.
For primary bibliographic entry see Field 5C.
W74-10804

COMPUTER MODELING OF SEDIMENT AND PHOSPHORUS MOVEMENT INTO CANADARAGO LAKE,
Cornell Univ., Ithaca, N.Y. Dept. of Agronomy.
G. F. Kling, and 10aG. W.
Cornell Agronomy Mimeo 74-11, 1974. 26 p, 9 fig, 4 tab, 5 ref.

Descriptors: *Sediment transport, *Phosphorus, Movement, Lakes, Eutrophication, Erosion control, Grassed waterways, Computer programs, Land use, Contour farming, Watershed management, *New York.
Identifiers: *Canadarago Lake(NY), Greenbelts.

A complete description of materials and methods necessary for the use of a sediment transport computer model is given. Maps illustrate sediment losses in the Canadarago Lake drainage basin, with sediment moving into and toward Canadarago Lake. Much of the phosphorus moves downslope on eroded soil particles. More than 50 tons of sediment per acre per year are lost from some ares. Soil loss was calculated for 4192 10-acre cells in the drainage basin. Sediment deposition as well as soil loss was considered for each computer cell. Movement of sediment and attached phosphorus was modeled from cell to cell until ultimate deposition in streams emptying into the lake. This calculated sediment transport model accounted for more than 90% of the variation of measured annual phosphorus losses. Via computer, effects of three proposed land use changes were simulated. Two changes involved zoning protective greenbelts of forest or grass along stream banks and lakeshores. The third change involved placing all farmland under contour strip cultivation. Zoning a 660-ft greenbelt of permanent pasture on both stream sides resulted in a predicted reduction of 15% in total sediment and 6% reduction in total phosphorus yield. (Jones-Wisconsin)
W74-10807

PLANT GETS NEW PROCESS,
Ecolotrol, Inc., Bethpage, N.Y.
For primary bibliographic entry see Field 5D.
W74-10815

STREAM GAGING BY CONTINUOUS INJECTION OF TRACER ELEMENTS,
Arizona Univ., Tucson.
For primary bibliographic entry see Field 2E.
W74-10826

SANITARY LANDFILL LEACHATE INTERACTIONS WITH A CARBONATE-ROCK DERIVED SOIL IN CENTRAL PENNSYLVANIA,
Pennsylvania State Univ., University Park. Dept. of Geology and Geophysics.
B. E. Lane.
M Sc Thesis, March, 1969. 197 p, 50 fig, 22 tab, 31 ref, 3 append.

Descriptors: Carbonates, Mechanical properties, Soil types, Clay loam, Clays, Loam, Dolomite, Sandstones, Sands, *Soil water, Leachate, Leaching, Artificial recharge, Pollution, Landfills, *Sanitary fill, Solid wastes, Sanitary engineering, Bacteria, *Groundwater, *Pennsylvania, Water pollution sources.
Identifiers: Clay mineral x-ray analysis, Leachate quality, BOD concentration, Bacterial sampling.

The carbonate-rock derived residual soil at the State College, Pennsylvania sanitary landfill site was classified on the basis of its mechanical properties and was found to range from clay-loam (clayey) to loamy-sand (sandy). Three objectives of this investigation were: (1) to determine the quality of leachate produced from solid refuse derived largely from domestic sources, (2) to determine the change in quality of leachate with time since the fill was emplaced, and (3) to determine the time-rate change (renovation in leachate as it moved through a carbonate-rock derived soil). These objectives were fulfilled from a qualitative point of view, at least for the early history (9 months) of a sanitary landfill. By artificially recharging water to the emplaced refuse, leachate was produced in significant amounts sooner than it would have been under natural conditions in the absence of extensive surface runoff. This study demonstrated that the use of suction lysimeters to obtain soil water samples, in conjunction with chemical and physical analyses of the soil water, is an excellent technique for tracing the movement of pollutants in the soil adjacent to a sanitary landfill trench. (Campbell-NWWA)
W74-10827

THE DISTRIBUTION OF MINOR ELEMENTS BETWEEN COEXISTING CALCITE AND DOLOMITE IN THE GASPORT MEMBER OF

THE LOCKPORT FORMATION, LOCKPORT, NEW YORK,
New York State Univ., Buffalo.
For primary bibliographic entry see Field 2F.
W74-10861

BASIC DISPOSAL-WELL DESIGN,
Du Pont de Nemours (E.I.) and Co., Wilmington, Del. Engineering Service Div.
A. C. Barlow.
In: Underground Waste Management and Environmental Implications, symposium held December 6-9, 1971, Houston, Texas, p 72-76, (1971). 4 fig.

Descriptors: *Injection wells, Injection, Waste disposal, Underground waste disposal, Design, *Waste disposal wells.
Identifiers: *Injection well completions, Disposal wells, *Disposal well design.

Two factors, safety and utility, are basic in the design of disposal wells. Disposal wells are two general types, those which are considered open-hole completions, and those which are normal completions. Open-hole completions are common in areas where disposal zones are in unconsolidated sands. These wells utilize gravel-packed screen sections and are generally similar in design to large-capacity wells. Other open hole completions are made in more competent disposal zones. In places where the disposal liquid may attack the formations, casing is required to complete the well. Tubing and packer requirements vary depending on the nature of the waste stream. Lined tubing is required in almost every case to avoid excessive corrosion. Tubing lining may be either sprayed-on plastic or thin gage metallic alloys swedged to the base metal. Packers must be made of the same materials as the tubing to insure longevity. In some wells, hydraulic seals are used rather than packers. Such installation is satisfactory if injection is always under pressure. In every case, safety of the injection-well installation is a paramount consideration. (See also W72-14480) (Martino-NWWA)
W74-10865

DEEP-WELL ACID DISPOSAL--PLANNING AND COMPLETION,
Halliburton Services, Duncan, Okla.
G. W. Ostroot, and J. Ramos.
In: Underground Waste Management and Environmental Implications, symposium held December 6-9, 1971, Houston, Texas, p 77-84, (1971). 6 fig, 1 tab, 9 ref.

Descriptors: *Injection wells, *Underground waste disposal, Waste disposal, Geologic investigations, *Feasibility studies.
Identifiers: *Deep-well acid disposal, Injection well planning, *Injection well completions.

The increased use of deep-well disposal will require feasibility studies that include an analysis of the disposal reservoirs, and a detailed geologic study to determine the presence of faults or abandoned wells that could be a source of contamination of potable waters. Many of the cementing procedures used in the oil industry are also used in disposal wells; however, added precautions must be taken in the design of the casing and injection strings. These precautions include the use of materials that are resistant to chemical attack, such as special alloys and fiberglass. Oil-well cements may be used in wells where the effluent is organic - e.g., weak organic acids, sewage waste, ferric chloride, and chemically treated effluents having a pH of 6 or above. A formulation of cement and liquid resin will resist attack from dilute acid solutions. The latest development in resin compositions is a blend of epoxy resin and an inert filler. This resin system has shown considerable promise for use in cementing disposal wells. It is resistant to concentrated acidic and caustic effluents and provides excellent bonding properties to the tubular goods. (See also W72-14480) (Campbell-NWWA)
W74-10866

REQUIREMENTS FOR THE MONITORING OF INDUSTRIAL DEEP-WELL WASTE-DISPOSAL SYSTEMS,
Dow Chemical Co., Houston, Tex.
J. S. Talbot.
In: Underground Waste Management and Environmental Implications, symposium held December 6-9, 1971, Houston, Texas, p 85-92, (1971). 16 fig, 5 ref.

Descriptors: Waste disposal, *Underground waste disposal, *Monitoring, *Telemetry, Injection wells, Industrial waste.
Identifiers: *Waste injection monitoring.

The three principal areas of interest in monitoring subsurface injection are: (1) the well, (2) the surface equipment, and (3) the subsurface. Minimum monitoring requires measurement of the wellhead injection pressure and injection tube-casing annulus pressure; definition of corrosion effects of the waste; bottomhole monitoring of injection pressures; and, the location of a conductor-insulator interface. Monitoring of surface equipment should include records of injection-pump discharge pressure; the rate and cumulative measurement of the injected volume; injecta temperature and quality and, the corrosive effects of the injecta upon the construction materials. An occasional monitoring requirement is the drilling of one or more wells to the disposal formation to obtain formation pressures and fluid samples. This technique may be economically feasible when disposal is into relatively shallow formations. (See also W72-14480) (Staplin-NWWA)
W74-10867

DEEP DISPOSAL SYSTEMS FOR RADIOACTIVE WASTES,
Office of Environmental Affairs (AEC), Washington, D.C.
W. G. Belter.
In: Underground Waste Management and Environmental Implications, symposium held December 6-9, 1971, Houston, Texas, p 341-351, (1971). 15 ref.

Descriptors: *Radioactive waste disposal, Radioactive waste, Underground waste disposal, Tritium, Krypton radioisotopes, Injection wells, Waste disposal wells, *Kansas.
Identifiers: Salt-mine repository, Lyons(Kan).

The Atomic Energy Commission has adopted a regulatory policy which requires that all high-level wastes from licensed irradiated-fuel-reprocessing plants must be solidified and shipped to a national repository on land owned and controlled by the federal government. A tentative selection of a site near Lyons, Kansas, has been made for an initial salt-mine repository for the demonstration of long term storage for both solid high-level and long-lived alpha-contaminated wastes. Because of general requirements for adequate monitoring to assure the safe and effective operation of a deep-well injection system, this method has not been used generally for disposal of radioactive wastes. It appears that injection into deep permeable formations may be a practical solution for the disposal of large quantities of tritium-bearing wastes from water reactors and nuclear-fuel-reprocessing plants in the future. Additional research is also required on the potential deep disposal of noble gases such as krypton-85 from reactor and reprocessing plant off-gas streams. (See also W72-14480) (Campbell-NWWA)
W74-10869

LIABILITY FOR HARM FROM UNDERGROUND WASTE DISPOSAL,
Wyoming Univ., Laramie.
F. J. Trelease.
In: Underground Waste Management and Environmental Implications, symposium held December 6-9, 1971, Houston, Texas, p 369-375, (1971). 34 ref.

Descriptors: *Underground waste disposal, *Legal aspects, Trespass, Damages.
Identifiers: *Liability.

The general principles of civil liability for conduct which harms a person are that such a person must show a legal injury to a right protected by law, caused by an act of the defendant which the law regards as wrong. The four theories of tort law most likely to be applied in a case of harm from underground waste disposal are (1) trespass, an intentional invasion of the physical property of the plaintiff; (2) negligence, the causing of harm through failure to use reasonable care to avoid injury; (3) nuisance, the use of property so as to cause unreasonable interference with the use and enjoyment of another's property; and (4) strict liability, imposed without regard to fault upon those who engage in abnormally dangerous activities. The plaintiff's remedies are damages and injunction. The actor has few defenses other than to attack the theory of the plaintiff for lack of an element of his case. The new trend in law is toward conditional fault, which permits desirable conduct although it carries possibilities of harm, but which requires the actor to pay if harm occurs. (See also W72-14480) (Staplin-NWWA)
W74-10870

REGULATION OF SUBSURFACE DISPOSAL IN TEXAS,
Texas Water Development Board, Austin.
R. Hill.
In: Underground Waste Management and Environmental Implications, symposium held December 6-9, 1971, Houston, Texas. p 381-385, (1971). 2 fig.

Descriptors: *Underground waste disposal, Well permits, *Well regulations, Injection wells, Disposal wells, *Legal aspects, Texas.
Identifiers: Texas Water Quality Board, *Texas Injection Well Act.

To begin drilling an injection well, or to convert an existing well into an injection well, a permit must be obtained from the Texas Water Quality Board. If the injection well is to be used for the disposal of waste arising from the production of oil or gas, the permit must be obtained from the Texas Railroad Commission. An application must be accompanied by a letter from the Railroad Commission stating that the well will not endanger any oil or gas resources. The Water Quality Board is required to send copies of each application to the Texas Water Development Board, the Texas State Department of Health, and the Texas Water Well Drillers Board. Each application is reviewed by the technical staff of the Board and recommendations for approval or denial of the application are given. An approval to drill an injection well is granted when it has been determined that disposal injection will have less effect on the environment than other means of disposal, that the well will not impair existing rights, and that water pollution will not occur. The permittee must report on the wellhead injection pressures and on the volume and quality of waste injected. (See W72-14480) (Martino-NWWA)
W74-10871

NITRATES IN WATER SUPPLIES.
International Water Supply Association, London (England). International Standing Committee on Water Quality and Treatment.
Aqua, No 1, p 5-25, 1974. 6 tab, 67 ref.

Descriptors: *Reviews, *Public health, *Nitrogen, *Nitrates, *Water supply, Domestic wastes, Safety, Bacteria, Pathology, Disease, Pilot plants, Runoff, Industrial wastes.
Identifiers: Methemoglobinemia.

An international investigation was made to review the effects of raised nitrates in water supplies on health and water quality. Elevated nitrate concentration in the diet and large numbers of nitrate-reducing bacteria in the upper digestive tract are a primary cause of infantile methemoglobinemia. Susceptibility varies with external conditions, but a safety factor in public health should be taken into account. It was concluded that the recommended limit of 45-50 mg/liter should not be raised but should be further investigated. Water resources with more nitrate than 45-50 mg/liter could be made safe by diluting with water of lower nitrate content. Pilot plants have tested processes for removal of nitrate from sewage and water. Another alternative is to search for the origin of nitrogen in all forms from domestic sewage, as well as industrial wastes and runoff, and to control these sources. (Prague-FIRL)
W74-10886

UPTAKE OF CHLOROBIPHENYLS BY OYSTERS,
Woods Hole Oceanographic Institution, Mass.
V. Vreeland.
Environmental Pollution, Vol 6, No 2, p 135-140, February, 1974. 2 fig, 16 ref.

Descriptors: *Polychlorinated biphenyls, *Oysters, Chlorination, Sea water, *Absorption.
Identifiers: *Chlorobiphenyls uptake.

Accumulation of individual chlorinated biphenyls in small osyters (Crassostrea virginica) was proportional to the degree to chlorination of the isomer and to its concentration in seawater at environmental levels. Equilibrium was reached after one month, with concentration factors of 1200 to 48,000 for isomers with 2 to 6 chlorine atoms per molecule. Partitioning of PCB between more hydrophobic lipids and ambient seawater has been rejected as the uptake mechanism. (Sandoski-FIRL)
W74-10889

EFFECT OF PH ON SURVIVAL OF ESCHERICHIA COLI,
Central Public Health Engineering Research Inst., Nagpur (India).
For primary bibliographic entry see Field 5D.
W74-10890

RIVERS POLLUTION SURVEY IN SCOTLAND IN RETROSPECT AND PROSPECT,
Secretary of State for Scotland, Edinburgh. Scottish Development Dept.
For primary bibliographic entry see Field 5G.
W74-10896

5C. Effects Of Pollution

PREPARATION AND PROPERTIES OF QUINALDINE SULFATE, AN IMPROVED FISH ANESTHETIC,
Bureau of Sport Fisheries and Wildlife, La Crosse, Wis. Fish Control Lab.
For primary bibliographic entry see Field 8I.
W74-10386

TOXICITY OF QUINALDINE SULFATE TO FISH,
Bureau of Sport Fisheries and Wildlife, La Crosse, Wis. Fish Control Lab.
L. L. Marking, and V. K. Dawson.
Bureau of Sport Fisheries and Wildlife, Investigations in Fish Control, No 48, April 1973. 6 p, 6 tab, 16 ref.

Descriptors: *Fish management, *Fish control agents, *Fisheries, *Fish toxins, Fish physiology, Chemical reactions, Cold-water fish, Warm-water fish, Water quality, Water properties, Water temperature, Hydrogen ion concentration, Analytical techniques.
Identifiers: *Fish anesthesia, *Quinaldine sulfate, Fish handling.

The acute toxicities of the candidate fish anesthetic, quinaldine sulfate (QdS04), were determined against selected species of coldwater and warmwater fishes. The LC50's (concentrations producing 50% mortality) were derived for 3-, 6-, 24-, and 96-hr exposures in bioassays with different temperatures, hardnesses, and pH's. The 96-hr LC50's of QdS04 ranged from 6.8 mg/liter for largemouth bass to 72.5 mg/liter for carp. In very soft water QdS04 solutions are acidic and considerably less toxic than in harder water. This lack of activity is attributed to a decrease in the pH of the test solution which thereby decreases the concentration of the active, un-ionized form of the molecule. (Woodard-USGS)
W74-10387

THE EFFICACY OF QUINALDINE SULFATE AS AN ANESTHETIC FOR FRESHWATER FISH,
Bureau of Sport Fisheries and Wildlife, Washington, D.C.
For primary bibliographic entry see Field 8I.
W74-10388

RESIDUE OF QUINALDINE IN TEN SPECIES OF FISH FOLLOWING ANESTHESIA WITH QUINALDINE SULFATE,
Bureau of Sport Fisheries and Wildlife, La Crosse, Wis. Fish Control Lab.
J. B. Sills, J. L. Allen, P. D. Harman, and C. W. Luhning.
Bureau of Sport Fisheries and Wildlife, Investigations in Fish Control, No 50, April 1973. 7 p, 1 fig, 8 tab, 7 ref.

Descriptors: *Fish management, *Fish control agents, *Fish physiology, *Toxicity, Fish toxins, Chemical reactions, Water properties, Warmwater fish, Salmonids, Cold-water fish, Water temperature.
Identifiers: *Fish anesthesia, *Quinaldine sulfate, Fish handling.

The concentration and persistence of residues of the anesthetic quinaldine in five species of both coldwater and warmwater fishes were measured following treatment with quinaldine sulfate. Quinaldine accumulated in relation to increasing temperature, treatment concentration, and length of exposure. Mean concentrations of quinaldine residues ranged from 1.18 to 8.31 microgram/g for the 0-hr withdrawal time. Initial residues were higher in warmwater species than in salmonids. Although a wide range of residue concentrations (0.80-9.34 micrograms/g) occurred immediately after exposure, these residues are dissipated rapidly when the fish are placed in fresh water. All fish tested after 24 hrs of withdrawal in fresh water contained 0.01 micrograms/g or less of quinaldine residue with the exception of the rainbow trout treated at 7C. (Woodard-USGS)
W74-10389

PHASE II: TEMPERATURE REQUIREMENTS OF SALMONIDS IN RELATION TO THEIR FEEDING, BIOENERGETICS, GROWTH AND BEHAVIOR,
Oregon State Univ., Corvallis. Dept. of Fisheries and Wildlife.
G. E. Davis.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-234 339 $3.25 in paper copy, $2.25 in microfiche. Oregon Water Resources Research Institute, Corvallis, Completion Report, June 30, 1974. 24 p, 8 fig, 3 tab, 3 ref. OWRR B-027-ORE(4).

Descriptors: Heated water, Thermal pollution, Water pollution effects, *Temperature, *Salmonids, *Stream fisheries, Ecosystems, Fish diets, *Chinook salmon, Fish reproduction, Growth rates, Rainbow trout.

Model stream ecosystems were used to evaluate the effect of a moderate increment of temperature change (4C) on the survival, growth and production of juvenile chinook salmon, Oncorhynchus tshawytscha, and on the abundance of the stream invertebrates. Growth rates were not greatly different between the heated and control stream but, because of higher survival rates, values of annual production were markedly greater in the control than in the heated stream. The abundance of food organisms, especially the mayflies and stoneflies, was greater and the number of kinds was greater in the control than in the heated stream. Laboratory studies defined relationships between rates of growth and food consumption for juvenile steelhead trout, Salmo gairdneri, kept as ambient and at elevated (3 and 6C) fluctuating temperatures during different seasons. Decelerating, curvilinear relationships were defined in most experiments. At low rates of food consumption temperature increase reduced growth rates. As consumption rate increased curves defined for control and elevated temperatures tended to converge. Food consumption rates of trout in a natural stream were estimated by comparing the fishes' growth rates with those of fish kept in the laboratory at known rations. Results suggested that if food availability remained unchanged, increase of temperature above normal seasonal temperatures would decrease growth rates of trout in their natural environment.
W74-10394

LIMNOLOGY OF LAKE MINNETONKA,
Minnesota Univ., Minneapolis. Limnological Research Center.
R. O. Megard.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-234 322, $5.50 in paper copy, $2.25 in microfiche. Dept. of Ecology and Behavioral Biology, March 1974. Interim Report No 11. 45 p, 12 fig, 9 tab, 18 ref. OWRR A-026-MINN(2).

Descriptors: *Phytoplankton, *Eutrophication, *Phosphorus, *Chlorophyll, *Minnesota, Lakes, Limnology, Water pollution effects, Morphometry, Sewage effluents, Nutrients.
Identifiers: *Lake Minnetonka(Minn), Organic carbon.

Fluctuations of population densities of phytoplankton in 4 basins of Lake Minnetonka in Minnesota were inferred from changes of concentrations of chlorophyll a and particulate organic carbon during the ice-free season. Concentrations of chlorophyll a during 1972 and 1973 were similar to those during 1968 and 1969 except in the lake's largest basin, where concentrations during 1972 and 1973 were only about 50% as high as during 1968 and 1969. The decrease of chlorophyll is attributable to the reduced influx of phosphorus, which decreased from about 13 metric tons/year because sewage effluents were diverted away from the basin during the winter of 1971-1972. The decrease of chlorophyll coincided with lower concentrations of total phosphorus. The average quantity of phosphorus in the Lower Lake decreased from 13 metric tons in 1968 and 1969 to 10 metric tons in 1973, and the average concentration of total phosphorus decreased from 62 mg m-3 to 47 mg m-3. The decrease between 1969 and 1973 is 42% of the decrease that will be required to reach the new steady state concentration of 26 mg m-3 that is expected to be achieved by 1977. The loss of phosphorus through the outlet of Lake Minnetonka is negligible. Most of the phosphorus lost from the water since 1971 must have been deposited in the sediments. The net rate of phosphorus sedimentation is almost 0.5 g m-2 yr-1. (Walton-Minnesota)
W74-10418

MECHANISMS THAT REGULATE GROWTH RATES OF PHYTOPLANKTON IN SHAGAWA LAKE, MINNESOTA,
Minnesota Univ., Minneapolis. Limnological Research Center.
R. O. Megard, and P. D. Smith.
Limnology and Oceanography. Vol 19, No 2, p 279-296, March 1974, 9 fig, 8 tab, 48 ref. OWRR A-016-MINN(6).

Descriptors: *Phytoplankton, *Eutrophication, *Photosynthesis, *Chlorophyll, *Minnesota, Growth rates, Regulation, Lakes, *Productivity, Water pollution effects.
Identifiers: *Shagawa Lake(Minn), *Aphanizonienon, Organic carbon.

Mean concentrations of chlorophyll a at six localities in Shagawa Lake in Minnesota ranged from 15 to 25 mg m-3 during June and July, increased to a maximum of 150 mg m-3 during a bloom of Aphanizonienon that occurred in August, and decreased rapidly in early September. Theoretical limits for integral photosynthesis and the total annual integral photosynthesis were calculated from estimates of attenuation coefficients for illumination, specific photosynthetic rates, and chlorophyll concentrations. Mechanisms responsible for the phytoplankton bloom are inferred from the changes of specific rates of production and specific rates of loss of particulate organic carbon in the mixed layer. Both rates decreased as the bloom developed, the latter decreasing faster than the former. The bloom ended when the specific loss rate suddenly increased. The specific production rate may have decreased during the bloom as nutrient utilization was inhibited by self-shading; bouyancy changes may have been primarily responsible for the changes of specific loss rates, acting as a critical mechanism of population regulation. The effects on phytoplankton populations of changing specific production and loss rates are demonstrated by comparing the integral photosynthetic rates and chlorophyll concentrations that would prevail under steady state conditions. (Walton-Minnesota)
W74-10422

THE FATE OF OIL SPILT AT SEA.
Central Dockyard Lab., Portsmouth (England).
For primary bibliographic entry see Field 5B.
W74-10434

DREDGING AND SPOILING ON LONG ISLAND,
State Univ. of New York, Stony Brook. Marine Sciences Research Center.
J. S. O'Connor.
Technical Report No 19, November 1973. 34 p, 3 fig, 2 tab, 42 ref.

Descriptors: *Dredging, *New York, *Spoil banks, Landfills, Channel improvement, Land forming, Environment, Environmental effects, Water pollution effects.
Identifiers: Environmental impact(Dredging), Spoiling, *Long Island(NY).

Dredging and spoiling activity in the shore zone of Nassau and Suffolk Counties, New York, are summarized for the years 1961 through 1971. Statistics on dredge activity (volume dredged and area spoiled) are compiled and reviewed in terms of private and governmental actions, geographic distribution, and temporal trends. Most of the activity has been conducted at the margins of Great South and Peconic Bays, principally for maintenance dredging of navigation channels and development of the shore zone for residential and commercial purposes. A marked reduction in activity occurred in 1968. The environmental impacts of large-scale spoil actions are major and persistent. Spoil sites are typically developed rather quickly wherever population pressures and land values are high. The existing Permit System for dredging and spoiling is discussed. Recommendations for improving the planning and monitoring of activity are made in the context of environmental impact and existing regulations by various levels of government. (Knapp-USGS)
W74-10439

DRUG RESISTANT COLIFORMS CALL FOR REVIEW OF WATER QUALITY STANDARDS,
National Inst. for Water Research, Pretoria (South Africa).
For primary bibliographic entry see Field 5D.
W74-10497

2 RIVERS: VIRGINIA'S JAMES AND MARYLAND'S CHESTER.
Central Atlantic Environment Center, Washington, D.C.
For primary bibliographic entry see Field 5B.
W74-10503

A TISSUE ENZYME ASSAY FOR CHLORINATED HYDROCARBON INSECTICIDES,
Minnesota Univ., St. Paul. Dept. of Entomology, Fisheries and Wildlife.
L. K. Cutkomp.
Copy available from GPO Sup Doc as EP1.23:660/2 73-027, $0.85; microfiche from NTIS, Springfield, Va 22161 as PB-234 404, $2.25. Environmental Protection Agency, Technology Series Report EPA-660/2-73-027. May 1974. 39 p, 9 fig, 7 tab, 27 ref. EPA Project 16030 ELZ. R 801029.

Descriptors: *Chlorinated hydrocarbon pesticides, *Insecticides, *Enzymes, *Assay, *DDT, Water pollution effects, Lethal limit, Acoricides, Toxicity.
Identifiers: *Adenosine triphosphate phosphohydrolase(ATPase).

Certain chlorinated hydrocarbon insecticides, especially DDT and closely related chemicals, tested at low concentrations, adversely affect the ATPase enzyme system. DDT inhibited oligomycin-sensitive Mg2+ATPase (mitochondrial) both in vitro and in vivo. About 1 micromole gave 50% inhibition in fish brain and 0.5 ppb of DDT on water inhibited about 50% of mitochondrial Mg2+ATPase. Na+-K+APase was not inhibited in brain, but was inhibited in vivo in fish gills. Certain discriminating effects were found among chlorinated hydrocarbons, particularly with respect to inhibition of Mg2+ ATPase, but the ranking of compounds by enzymic effects does not always parallel toxicity values. Organophosphate and carbamate insecticides were ineffective. Further research is needed both in vitro and in vivo to determine how the adverse effects on the enzymes relate to practical interpretations of effects. The abnormally low ATPase activity in chronically treated fish is the first report of an adverse biochemical effect with sublethal doses of DDT. All effects appear to be primarily within the group of insecticides and acricides which are persistent in parts of the environment and in organisms. (EPA)
W74-10526

THE EFFECTS OF VARIATIONS IN TURBIDITY ON CYCLES OF PLANKTONIC AND BENTHIC ORGANISMS IN FLOOD CONTROL RESERVOIRS OF NORTHERN MISSISSIPPI,
Mississippi Univ., University. Dept. of Biology.
Y. J. McGaha, and J. P. Steen.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-234 437, $3.25 in paper copy, $2.25 in microfiche. Mississippi Water Resources Research Institute, Mississippi State, Completion Report, July 1974. 29 p, 2 fig, 2 tab, 19 ref. OWRR A-072-MISS(1).

Descriptors: *Benthic fauna, *Diatoms, *Cyanophyta, *Chlorophyta, Algae, *Turbidity, Productivity, *Mississippi, Flood control, Reservoirs, Reservoir operation, Plankton, Physicochemical properties, Benthos, Water pollution effects, *Anabaena.
Identifiers: *Melosira sp.

Plankton populations, turbidity and other physicochemical parameters were sampled in four flood control reservoirs of northern Mississippi. Numbers of organisms were compared with turbidity and other concomitant variables. Each plankter responded to environmental changes in an individual manner. A factor which led to decrease in population of one plankter may enhance that of another. High turbidity was deleterious to green and blue-green algae and led to drastic reductions in their numbers. High silica content associated with high turbidity led to substantial increases in diatoms. In the presence of high silica content the diatom Melosira sp. showed large populations at all depths in spite of the high turbidity. Anabaena sp. and other blue-green algae and many green algae decreased drastically as turbidity increased above 25 ppm, but as turbidity decreased their population increase was directly correlated with phosphate content. Benthic fauna appeared to be more closely related to bottom type, submerged vegetation and normal life cycles than to turbidity.
W74-10532

MACROBENTHOS AS INDICATORS OF ECOLOGICAL CHANGE,
Lamar Univ., Beaumont, Tex. Dept. of Biology.
For primary bibliographic entry see Field 5B.
W74-10534

SURVIVAL OF ESCHERICHIA COLI IN OLIGOTROPHIC WATERS,
Washington State Univ., Pullman. Dept. of Civil and Environmental Engineering.
D. L. Johnstone.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-234 461, $3.75 in paper copy, $2.25 in microfiche. Completion Report, June 30, 1974. 66 p, 17 fig, 3 tab, 44 ref. OWRR A-063-WASH(1). 14-31-0001-4048.

Descriptors: *Oligotrophy, Coliforms, *Periphyton, Protozoa, Bacteria, *Escherichia Coli, Microorganisms, Water pollution effects, *Washington.
Identifiers: *Colpidium sp, *Cytophaga sp, *Psychrophilic bacteria.

The effects of the indigenous microflora and microfauna of oligotrophic high-mountain waters upon the survival of fecal coliforms have been studied. Surface water and periphytic (aufwuchs) populations were examined for their anticoliform activity at 0, 5.5, and 11C. The most pronounced coliform die-off occurred at 11C. At this temperature, the indigenous bacterial and protozoan populations increased in density most readily. Periphytic populations were more effective in coliform eradication than surface water populations at all tested temperatures. In both surface water and periphytic samples, a peritrichously flagellated protozoan, tentatively identified as Colpidium sp., was observed actively feeding on the coliform populations following repeated exposure of coliforms to the indigenous microorganisms. Several genera of psychrophilic bacteria were isolated from these water. Of these, 13 isolates of Cytophaga sp. have been shown to be facultative psychrophiles.
W74-10535

NTA AND MERCURY IN ARTIFICIAL STREAM SYSTEMS,
Georgia Univ., Athens. Inst. of Ecology.
For primary bibliographic entry see Field 5B.
W74-10538

WATER QUALITY CRITERIA DATA BOOK - VOL. 5 - EFFECTS OF CHEMICALS ON AQUATIC LIFE,
Battelle Columbus Lab., Ohio.
H. T. Kemp, R. L. Little, V. L. Holoman, and R. L. Darby.
Copy Available from GPO Sup Doc as EP1.16:18050 HLA 09/73, $4.95; microfiche from NTIS, Springfield, Va 22161 as PB-234 435, $2.25. Environmental Protection Agency, Water Pollution Control Research Series, Report 18050HLA09/73, September 1973. 537 p. Grant No. R-800942. EPA Project 18050 HLA.

Descriptors: *Toxicity, *Water pollution effects, Industrial wastes, Pesticides, Aquatic plants, Aquatic animals, Absorption, *Reviews, Marine fish, Freshwater fish, Chlorinated hydrocarbon pesticides, Carbamate pesticides, Phosphothicate pesticides, Organic acids, Antibiotics(Pesticides), Heavy metals, Metals, Inorganic pesticides, Biochemical oxygen demand, Thiocarbamate pesticides, Triazine pesticides, Organophosphorus pesticides, Polychlorinated biphenyls, Surfactants, Nutrients, Urea pesticides, Organic compounds, Organic pesticides, Zooplankton, Phytoplankton, Aquatic algae, Marine algae, Water birds, Chlorophyta, Pyrrophyta, Cyanophyta, Chrysophyta, Crustaceans, Mollusks, Annelids, Aquatic insects, Benthic fauna, Protozoa, Invertebrates, Diatoms, Euglenophyta, Frogs, Marine animals, Newts, Toxins, Phenolic pesticides, Dyes, Chemical, *Data collections, *Water quality standards, *Pollutant identification.
Identifiers: Anesthetics, Oil dispersants, Echinoderms, Macroinvertebrates, *Water quality data.

This report is an extensive compilation of data on the effects of chemicals on aquatic life which were extracted from literature published during the period 1968-1972. It is an update of an earlier report entitled 'Water Quality Criteria Data Book, Volume III, Effects of Chemicals on Aquatic Life' (Kemp, et al., 1971). The data are arranged alphabetically by chemical and are concisely represented in a columnar format which includes organism names, type of study, chemical effect, controlled parameters, significant comments on the test, and source of the data. The data were compiled using a program prepared as part of the work. (See also W72-08157, W72-08158, W73-01976 and W73-03503) (EPA)
W74-10541

A REVIEW OF THE PHYSIOLOGICAL IMPACT OF MERCURIALS,
Savannah River Ecology Lab., Aiken, S.C.
M. C. Ferens.
Copy Available from GPO Sup Doc as EP1.23:660/3-73-022, $1.00; microfiche from NTIS, Springfield, Va 22161 as PB-234 644, $2.25. Environmental Protection Agency, Ecological Research Series Report EPA-660/3-73-022 February 1974. 54 p, 138 ref. EPA Program Element IBA023. Project R800510.

Descriptors: *Heavy metals, Plant growth, *Animal metabolism, Mode of Action, Toxicity, *Biochemistry, Cytological studies, *Mercury, Plant physiology, Animal physiology, Enzymes, *Reviews, Photosynthesis.
Identifiers: *Mercury compounds, *Mercurials, Methyl mercury, Dimethyl mercury, Phenyl mercury, Methoxyethyl mercury, Ethyl mercury, Mercuric salts, Metallic mercury, Kreb's cycle enzymes, Kidney damage, Neurological damage.

Literature on the biological effects of mercurials was reviewed with the purpose of understanding impact on individual organisms in terms of biochemical or cellular damage. Mercurialism is manifested primarily in kidney or brain damage in animals and in growth reduction in plants. Exposure to inorganic mercury compounds usually results in kidney damage while alkyl mercurialism is characterized by brain damage; however, some degree of both kidney and neurological injury results from exposure to either category of mercurials. Kidney injury is due apparently to damage of Kreb's cycle enzymes, thus reducing available energy to actively resorbtions. Impaired protein synthesis as well as reduction in activity of Kreb's cycle enzymes may be important in brain damage resulting from mercury poisoning. Photosynthetic damage is apparently the biochemical bases of mercurial effects observed in plants. (EPA)
W74-10548

FORGING THE MISSING LINK,
L. F. Webster.
Water and Pollution Control, Vol 112, No 3, p 42-45, March 1974. 3 ref.

Descriptors: *Food chains, *Nutrients, Wastes, *Ecosystems, Shellfish, Nitrogen, Phosphorus, Sewage, Effluents, Algae, Sea water, Mollusks, Organic wastes, Domestic wastes, Aquiculture, Tertiary treatment, *Waste water treatment, *Recycling.

A study aimed at using high nutrient wastes as an integral part of a contrived food chain sequence is described. John Ryther of the Woods Hole Oceanographic Institution is working on a project which anticipates the controlled feeding of raw domestic sewage to a marine environment. This would promote the growth of specific types of algae that would be eaten by shellfish. The wastes of these shellfish then serve as food for sea worms that are, in turn, consumed by succeeding orders of fish higher in the food chain which, in turn, form part of a human diet. Undesirable elements would be trapped, or removed from the system elsewhere--viruses through containment in the shellfish; ammonia and phosphate via growth of other selected algae and seaweeds. This would establish a complex, multi-species food chain which would serve the dual function of a tertiary sewage treatment process and an aquiculture system producing a primary crop of shellfish and secondary crops of other potentially valuable marine organisms. (Merritt-FIRL)
W74-10558

NO RADIOACTIVE FISH IN LAKE MICHIGAN.
Industrial Research, Vol 16, No 3, p 22, 25, March 1974.

Descriptors: *Radioactivity, *Lake Michigan, Radioisotopes, Fish, Investigations, Computers, Water pollution sources, Water pollution effects.

The results of a study on radioactivity in Lake Michigan are discussed. Although environmentalists continue to push for greater precautions for nuclear reactors, a study issued by Environmental Research Group, Inc. reports that, even if the worst leakage allowed by the AEC were to occur from power plants around Lake Michigan, radioactivity in the lake's fish would not build up to a point higher than half the permissible level. Radioactivity from most isotopes in edible fish caught in the immediate vicinity of a nuclear power plant discharge would be practically none by the time the fish was consumed. In the case of iodine, for example, the highest level reached would be 5.5% of their permissible level. Moreover, the radioactivity would eventually be removed from the lake waters through burial in sediment or removal in food products. (Merritt-FIRL)
W74-10561

EFFECTS OF COPPER, ZINC, AND CADMIUM ON SELANASTRUM CAPRICORNUTUM,
Idaho Univ., Moscow. Dept. of Biological Sciences.
L. Bartlett, F. W. Rabe, and W. H. Funk.
Water Research, Vol 8, p 179-185, March 1974. 8 fig, 3 tab, 12 ref.

Descriptors: *Chlorophyta, *Copper, *Zinc, *Cadmium, *Toxicity, Algicides, Growth rates, Analysis, Algae, *Bioassay, *Utah, Water pollution effects.
Identifiers: *Selanastrum capricornutum, *Coeur d'Arlene River(Utah).

The algicidal and algistatic effects of copper, zinc, and cadmium on Selanastrum capricornutum, unicellular green algae were analyzed by using a modification of the Algal Assay Procedures Bottle Test. Algicidal concentrations of copper, zinc, and cadmium were 0.30, 0.70, and 0.65 mg/l. Treatment of Selanastrum with various concentrations of the metals resulted in similar growth rates characterized by extended lag growth phases. Combinations of the metals were similar in toxicity to equal concentrations of zinc. Combinations of copper and cadmium resulted in a greater growth rate than equal concentrations of copper suggesting that cadmium inhibits copper toxicity. Selanastrum was able to exist in waters from the upper South Fork and North Fork of the Coeur d'Alene River where zinc and other metals were in low concentration. However, the algae were not able to tolerate zinc concentrations greater than 0.5 mg/l from waters of other parts of the drainage. These observations were consistent with laboratory findings where 0.7 mg/l zinc was algicidal and 0.1 mg/l inhibited the growth of Selanastrum. (Merritt-FIRL)
W74-10563

A MATHEMATICAL MODEL OF A RIVER PURIFICATION LAKE,
Severn River Authority (England).
B. T. Chapman.
Water Treatment and Examination, Vol 22, No 4, p 269-291, 1973. 18 fig, 14 ref.

Descriptors: *Mathematical models, *Retention, *Water quality, *Effluents, *Lakes, Organic matter, Influents, *Chlorophyll, Algae, Dissolved oxygen, Treatment facilities, Sedimentation, Computers, Water pollution effects.

A mathematical model was developed of a river purification lake to predict the effect of various retention times on the quality of the lake effluent. The results showed that doubling the experimental retention time to 9.6 days would not remove the smallest particles, but halving the retention time to 2.4 days produced a deterioration in the effluent quality. The removal of soluble organic carbon within the lake was 21% of the influent concentration at 9.6 days retention and 6% at 2.4 days retention. The model predicted that, with a retention time of 9.6 days, by the middle of May the chlorophyll-a concentration in the lake would exceed 100 mg/cu m and would continue to increase throughout the summer. If this happened, the water would become extremely dark green with a skin of algae present on the surface. A retention period of only 2.4 days meant that the predicted chlorophyll-a concentration was only slightly greater than the concentration of the influent, showing the production was taking place only to a small extent. The maximum predicted chlorophyll-a concentration was 21 mg/cu m. The dissolved oxygen concentration was not predicted to fall below 3 mg/liter under any retention time. (Merritt-FIRL)
W74-10571

A STUDY OF DIISOPROPYLGUANIDINE AND DIISOPROPYLGUANIDINE HYDROCHLORIDE TO DETERMINE THEIR HYGIENIC LEVELS IN WATER BODIES, (IN RUSSIAN),
Nauchno-Issledovatelskii Institut Epidemiologii i Mikrobiologii, Lvov (USSR).
P. I. Fenyuk.
Gig Sanit. Vol 37, No 7, p 105-106, 1972.
Identifiers: *Guanidines, Hydrochlorides, Hygienic properties, *Organic compounds, Rodents, *Lethal limit, Water pollution effects.

Hygienic properties and effects were studied for determining maximum allowable water concentrations (MAWC). The LD50 values determined for albino rats and mice are 2.88 and 1.34 g/kg, respectively. A cumulation factor of 1.8 was found. MAWC of 1 mg/l is recommended.--Copyright 1973, Biological Abstracts, Inc.
W74-10598

IMPACT OF URBANIZATION ON QUALITY OF RIVER WATER (VLIYANIYE URBANIZATSII NA KACHESTVO RECHNYKH VOD),
Gosudarstvennyi Gidrologicheskii Institut, Leningrad (USSR).
For primary bibliographic entry see Field 5B.
W74-10632

ADSORPTION OF PHOSPHORUS BY LAKE SEDIMENT,
New Hampshire Univ., Durham.
R. D. Harter.
Soil Science Society of America Proceedings, Vol 32, No 4, p 514-518, July-August 1968. 5 fig, 1 tab, 12 ref.

Descriptors: *Bottom sediments, *Lakes, *Adsorption, *Phosphorus, Eutrophication, Nutrients, Algae, Phosphates, Path of pollutants, Limnology.

The sediments of eutrophic lakes are capable of adsorbing large amounts of phosphorus from the water. To study the sorption mechanism, between 0 and 2.2 mg P was added to 0.1 g sediment samples (1:50 sediment-solution ratio). After equilibrium was established, P remaining in solution was determined, and adsorbed P was extracted with 0.5N NH4F and 0.1N NaOH. Whereas all P adsorbed into the NaOH-extractable fraction appeared to occur as an iron phosphate, NH4F apparently extracted P bonded by two different mechanisms. When less than about 0.1 mg P was added, NH4F extracted a tightly bonded form of P, probably occurring as an aluminum phosphate. When more than 0.1 mg P was added, additional P in a more loosely bonded form was adsorbed into the NH4F-extractable fraction. The loosely bonded P appeared to be independent of Al content of the sediment and could be removed by successive water extraction. The capability of the sediment to adsorb considerable loosely bonded P means that large influxes of P into the lake may be held temporarily and subsequently released to growing plants and algae. (Knapp-USGS)
W74-10642

A PRELIMINARY ASSESSMENT OF THE ENVIRONMENTAL VULNERABILITY OF MACHIAS BAY, MAINE TO OIL SUPERTANKERS,
Massachusetts Inst. of Tech., Cambridge.
S. F. Moore, R. L. Dwyer, and A. M. Katz.
Available from NTIS, Springfield, Va 22161 as COM-73-10564 Price $3.00 printed copy; $2.25 microfiche. Massachusetts Institute of Technology Sea Grant Project Report MITSG 76-6, January 15, 1973. 162 p, 21 fig, 17 tab, 136 ref. NOAA Sea Grant 2-35150.

Descriptors: *Oil spills, *Maine, *Water pollution effects, Oil industry, Coasts, Beaches, Reviews, Ecology, Environment, Water pollution sources.
Identifiers: *Environmental vulnerability, *Machias Bay(Maine).

The environmental vulnerability of Machias Bay, Maine, to a proposed oil supertanker terminal was surveyed by review and interpretation of the existing literature on the subject. A framework is proposed for assessing impacts of environmental changes. Processes considered are transport and dispersion, biological transfers and modifications, and biological effects. Separate consideration is given to a description of existing conditions along the eastern coast of Maine, the composition and characteristics of crude petroleum and petroleum products, the effects of oil on marine organisms, and potential spill trajectories and behavior. There is a relatively high probability (10%-50%) that 10-20 miles of shoreline would be covered by a major oil spill. The results depend upon spill size, point of release, season of the year, and offshore currents. Machias Bay is highly vulnerable environmentally to oil supertankers. The release of a major catastrophic spill (30,000 tons) is expected to occur as frequently as once in 20 years and a moderate spill (500 tons) once every year. The biological effects of these are likely to be very extensive with some localized permanent changes in communities. (Knapp-USGS)
W74-10656

THE SIZE OF DIATOMS. V. THE EFFECT OF ANIMAL GRAZING,
Ministry of Agriculture, Fisheries and Food, Lowestoft (England). Fisheries Lab.
R. S. Wimpenny.
Journal of Marine Biological Association of the U.K., Vol 53, No 4, p 957-974, 1973. 10 fig, 6 tab, 8 ref.

Descriptors: *Size, *Diatoms, *Grazing, Marine algae, Oceans.
Identifiers: *Artemia salina, *Skeletonema costatum, *Tigriopus, *Ditylum brightwellii.

Eight series of experiments were conducted to determine any effect on centric diatom cell diameter that might be attributed to animal grazing on these populations. Artemia salina grazing on Skeletonema costatum, Tigriopus sp. on S. costatum and Artemia on Ditylum brightwellii were used. Fifty measurements of the cell diameters (transapical axes) were taken from each of the grazed and control samples which made up the series. Visual inspection of frequency distribution of diameters suggested that cells of grazed populations were larger than control. To test whether Artemia made any selection by size when feeding on non-growing objects this animal was kept in a dispersion of mulberry pollen. The medium used for the cultures was local sea water prepared and enriched by sodium nitrate, disodium hydrogen phosphate and soil solution. Before being introduced into the unialgal diatom cultures the chosen animals were cleansed and starved to avoid contamination by flagellates and protozoa. The results show that cells of grazed populations were larger than those of the ungrazed populations. (Jones-Wisconsin)
W74-10762

PROCEEDINGS OF MEETING ON ENVIRONMENTAL POLLUTION (3RD) HELD AT FORT MCNAIR ON 17-18 MAY 1972, SPONSORED BY AMERICAN ORDNANCE ASSOCIATION.
Edgewood Arsenal, Aberdeen Proving Ground, Md.
For primary bibliographic entry see Field 5G.
W74-10765

OUR GREAT LAKES,
Wisconsin Univ., Madison. Sea Grant College Program.
L. Weimer, W. Downs, J. Napoli, P. Mallonee, and P. Smith.
Available from the National Technical Information Service, Springfield, Va, 22161 as COM-73-11686, $3.50 in paper copy, $2.25 in microfiche. Report WIS-SG-73-114, September 1973. 48 p, 3 fig.

Descriptors: *Great Lakes, *Eutrophication, *Water pollution, Water policy, Recreation, Water supply, Beach erosion, Fisheries, Transportation, History, Management, Inland waterways, Lake Erie, Lake Huron, Lake Michigan, Lake Ontario, Lake Superior, Institutions.

The importance of the Great Lakes to the United States and Canada is examined. In 1972, over 200 million tons traveled the lakes with 53 million tons valued at 5 billion dollars, through the St. Lawrence Seaway. Iron ore, limestone, coal and grain represent the major commodities shipped. Increased railroad competition, the winter shut down and technical changes in requisite port facilities are identified as major challenges to the lakes' future shipping potential. Their recreational importance is also considered. Recreational uses face overcrowding, declining water quality and competing municipal and industrial water uses. Pollution poses an important danger to the lakes' future. These problems are examined for each lake in the chain. While Lake Erie represents the most polluted lake, it still supports the largest perch fishery within the Great Lakes. Erosion also threatens the lakes. One third of the U.S. lake side is subject to significant erosion and it is being accelerated by growing land use adjacent to the lakes. The myriad of local, state, federal, and international agencies controlling the quality of the Great Lakes are identified. Their potential roles in meeting the future changes are suggested. (Schroeder-Wisconsin)
W74-10784

EFFECTS OF ACUTE COLD SHOCK ON THE CHANNEL CATFISH, ICTALURUS PUNCTATUS,
Battelle-Pacific Northwest Labs., Richland, Wash.
R. M. Block.
Available from the National Technical Information Service, Springfield, Va 22161 as BNWL SA-4709, $3.00 in paper copy, $2.25 in microfiche. Report BNWL SA-4709 (1972). 15 p, 5 fig, 14 ref.

Descriptors: *Channel catfish, Water temperature, Cryogenics, Fish, Animal physiology, Cooling water, Powerplants, Mortality, *Thermal pollution.
Identifiers: *Acute cold shock, Osmoregulatory response.

Elevated temperatures near cooling water outfalls may bring water temperatures closer to the optimum or preferred temperature of certain fish species perhaps attracting fish which would then become 'trapped' in the cooling water discharge canals or mixing zones by metabolic acclimation to these higher temperature levels. Sharp temperature decreases may result when artificial heating water suddenly ceases, producing large fish kills. Changes in temperature, either acute or chronic, will affect the osmoregulatory response of fish. Specific physiological and biochemical changes in the blood may provide a sensitive method for predicting the effects on fish of sudden temperature variation in ambient water. Method for obtaining blood from fish and the actual measurement of osmolarity and chloride are quite simple. Response of channel catfish to cold shock is indicated by osmoregulatory collapse. Data denote a gradual decrease of plasma osmolarity and chloride during the period when catfish are exposed to cold stress. The disruption of the phase distribution in these fish is reversible up to a point in time but not completely reversible when temperature is again elevated to 30C. It takes channel catfish approximately four days to recover from cold shock stress. (Jones-Wisconsin)
W74-10785

BACTERIOLOGICAL SURVEYS, CHARLOTTE COUNTY, NEW BRUNSWICK, SHELLFISH AREA N.B. 13, 1973,
Environmental Protection Service, Ottawa (Ontario). Water Pollution Control Directorate.
C. R. Blaise, and R. Legault.
Report No EPS 5-WP-73-2, December 1973. 61 p, 3 fig, 31 tab, 16 ref.

Descriptors: *Bacteria, *Surveys, Commercial shellfish, Clams, Coliforms, *Canada, Water pol-

lution sources, Fish harvest, Regulation, Water pollution effects, Fisheries.
Identifiers: *Charlotte County(New Brunswick), Bay of Fundy(Canada).

Bacteriological surveys of Shellfish Area 13, located on the Bay of Fundy, encompassing shoreline waters from Red Head in the east to L'Etang Head in the west, were conducted. Reassessment was made of the current classification of these areas as either 'open' or 'closed' for shellfish harvesting for consumption in the raw state, and to determine whether shellfish from 'closed' areas could be exploited provided they underwent an approved purification process. Total of 575 sea water samples from 100 locations, 89 stream samples from 11 locations, 7 sewage samples from two locations and 45 clam (Mya arenaria) specimens from 9 locations were collected and analyzed for coliform and fecal coliform numbers. Results indicated the need for closure of Penn Harbour, within Red Head to Seely Head area, due to untreated domestic sewage inflows. Shellfish from this sector cannot even be harvested for purification purposes. Increased contamination by fish plant and domestic wastes warrant extension of the closure in Beaver Harbour even for purification purposes. A second closure was necessary in the Woodland-Buckman area. Water of poor bacteriological quality warranted closure of a major section within Deadman Harbour and Black's Harbour. (Jones-Wisconsin)
W74-10786

BACTERIOLOGICAL SURVEYS, CHARLOTTE COUNTY, NEW BRUNSWICK, SHELLFISH AREA N.B. 14, 1973,
Environmental Protection Service, Ottawa (Ontario). Water pollution Control Directorate.
C. R. Blaise, and R. Legault.
Report No EPS 5-WP-73-3, December 1973. 55 p, 3 fig, 30 tab, 12 ref.

Descriptors: *Bacteria, *Surveys, *Commercial shellfish, *Canada, Clams, Coliforms, Water pollution sources, Sea water, Fish harvest, Regulation, Water pollution effects, Fisheries.
Identifiers: *Charlotte County(New Brunswick), Bay of Fundy(Canada).

Bacteriological surveys of New Brunswick Shellfish Area 14, including L'Etang River and Harbour, Sturgeon and Little Sturgeon Cove, and the Back Bay area, were conducted to reassess the current classification of either 'open' or 'closed' for shellfish harvesting for consumption in the raw state, and to determine whether shellfish from 'closed' areas could be exploited provided they underwent an approved purification process. Total of 993 sea water samples from 46 locations, 58 stream samples from 8 locations, and 55 clam (Mya arenaria) specimens from 11 locations were collected and analyzed for coliform and fecal coliform numbers. Results showed that the L'Etang River is subject to gross contamination from a paper company. In L'Etang Harbour, untreated sanitary wastes from a hospital and the town pollute Sturgeon Cove waters. Clams from this area could be harvested for purification purposes. Bacteriological water quality west of Park and Goat Islands and in the southern section of L'Etang Harbour met shellfish-growing standards. Maintenance of the presently enforced closure at Back Bay was necessary due to sewage and fish plant waste inflows. All other sectors, including Stump Cove, Bull Head Cove, St. Martin Bay, and the coves within the Back Bay area, had waters of excellent bacteriological quality. (Jones-Wisconsin)
W74-10787

BACTERIOLOGICAL SURVEYS, CHARLOTTE COUNTY, NEW BRUNSWICK, SHELLFISH AREAS N.B. 9, 10, 11, AND 12, 1973,
Environmental Protection Service, Ottawa (Ontario). Water Pollution Control Directorate.
C. R. Blaise, and R. Legault.
Report No EPS 5-WP-73-1, December 1973. 58 p, 3 fig, 26 tab, 12 ref.

Descriptors: *Bacteria, *Surveys, Commercial shellfish, Clams, Coliforms, *Canada, Sea water, Water pollution sources, Fish harvest, Regulation, Water pollution effects, Fisheries.
Identifiers: *Charlotte County(New Brunswick), Bay of Fundy(Canada).

Bacteriological surveys of shellfish growing areas and adjacent waters were conducted in Charlotte County, New Brunswick during June-September 1973. A total of 596 sea water samples from 95 locations, 134 stream samples from 16 locations, and 50 clam (Mya arenaria) specimens from 10 locations were collected and analyzed for coliform and fecal coliform numbers. Results indicated the definite need for closures in parts of Little Lepreau Basin and Lepreau Harbour, and for abatement of domestic pollution from homes along the shoreline. Clams from these sectors, however, could be exploited after purification. The current New River Harbour closure should be maintained because of domestic sewage input from homes near the mouth of New River and because of the provincial park septic tank effluent input, particularly during heavy runoff periods. Other sectors of Area N.B. 11 were of exceptionally good bacteriological quality. The shellfish closure in Pocologan Harbour should be retained on a summer basis only; rescinding this closure from October 1 to May 31 is recommended because all known potential sources of fecal pollution are inoperative during that period. Bacteriological water quality in all other sectors of Pocologan Harbour are satisfactory. (Jones-Wisconsin)
W74-10788

SURFACE RUNOFF LOSSES OF SOLUBLE NITROGEN AND PHOSPHORUS UNDER TWO SYSTEMS OF SOIL MANAGEMENT,
Cornell Univ., Ithaca, N.Y. Dept. of Agronomy.
For primary bibliographic entry see Field 5B.
W74-10789

METABOLIC CYCLES FOR TOXIC ELEMENTS IN AQUEOUS SYSTEMS,
Minnesota Univ., St. Paul. Freshwater Biological Research Foundation.
J. M. Wood.
Revue Internationale d'Oceanographie Medicale, Vol 31-32, p 7-16, 1973. 2 fig, 1 tab, 17 ref.

Descriptors: *Toxins, *Inorganic compounds, *Biodegradation, *Aquatic environment, Chemical degradation, Oxidation, Chemical properties, Heavy metals, Mercury, Oxidation reduction potential, Arsenic compounds.
Identifiers: *Toxic elements, Biochemical cycles, Biosynthesis, Detoxification.

Metabolic cycles for elements regarded as toxic to higher organisms are reviewed and those parameters important in regulating these cycles are discussed. Those elements classified as very toxic and relatively accessible represent potential public health hazards. When inorganic compounds are introduced into biological systems, it should be recognized that enzyme systems have evolved which are capable of changing the oxidation states of such compounds. Bioaccumulation of reactive inorganic species depends largely upon the transport mechanisms from the intestine into the blood stream, and in the case of the potent neurotoxins, partition into the lipid regions. Three coenzymes are known to be involved in the methyl transfer reactions in biological systems: S-adenosylmethionine, N5-methyltetrahydrofolate derivatives, and methylcorrinoid derivatives. With the periodic table and knowledge of the properties of the toxic elements, prediction can be made of how most of these should behave. The mercury and arsenic cycles are detailed. Using the same approach, it can be predicted that tin, platinum, palladium, gold, and thallium will be methylated in the environment, but lead, cadmium, or zinc will not be methylated. (Jones-Wisconsin)
W74-10791

EXPERIMENTAL INVESTIGATIONS, AT LABORATORY (SIC), ON THE TRANSFER OF MERCURY OF MARINE TROPHIC CHAINS,
Centre d'Etudes et de Recherches de Biologie et d'Oceanographie Medicale, Nice (France).
F. Laumond.
Revue Internationale d'Oceanographie Medicale, Vol 31-32, p 47-53, 1973. 3 tab, 3 ref.

Descriptors: *Mercury, *Transfer, *Oceans, *Food chains, Phytoplankton, Zooplankton, Fish, Mollusks, Mussels, Toxicity, Copper, Zinc, Chromium, Lead, Laboratory tests.
Identifiers: Alkylation mechanisms, Pelagic food chain, Neritic food chain.

A method to study heavy metal toxicities evaluates a pelagic food chain including sea water - plankton Asterionella japonica and Diogenes sp. (phytoplankton) + Artemia salina (zooplankton - Cyprinidae (fish)) and neritic food chain with molluscs including sea water - phytoplankton (Diogenes sp.) - molluscs (mussels). The first trophic level (plankton) is contaminated with sea water polluted by addition of traces of mercuric chloride alone or associated with various organic compounds. The second trophic level, represented by fish or mollusc, is, as in natural conditions, contaminated at the same time by the water and by the food, that is, the first trophic level collected after its contamination by the water. For determination of mercury a titrimetric method with extraction by diphenyl-thio-carbazone or dithizone was usually employed using the neutron-activation method as a reference. Addition of 0.015 ppm of mercury to the water of the pelagic chain multiplies by 20 to 100 times the amount of mercury in plankton and by 20 to 40 times that in fish. An addition of 0.1 ppm of mercury to the water of the neritic chain with molluscs multiplies by 1000+ the amount of mercury in phytoplankton, and by 200 to 400 times that in mussels. (Jones-Wisconsin)
W74-10792

MARINE POLLUTION BY METALS AND THEIR ACCUMULATION BY BIOLOGICAL INDICATORS (ACCUMULATION FACTOR),
Trieste Univ. (Italy). Inst. of Hygiene.
L. Majori, and F. Petronio.
Revue Internationale d'Oceanographie Medicale, Vol 31-32, p 55-90, 1973. 52 fig, 11 tab, 10 ref.

Descriptors: *Oceans, *Pollutants, *Heavy metals, *Bioindicators, Mathematical models, Toxicity, Food chains, Cadmium, Copper, Lead, Mercury, *Mussels, Lethal limit.
Identifiers: *Accumulation factor.

Proliferation of potentially toxic metals in the marine environment and their accumulation by aquatic organisms to the point of endangering their survival and through food chains, with unpredictable consequences to man, is analyzed. Mussels, Mytilus galloprovincealis, proved sensitive indicators of metal pollution in laboratory tests and were the basis of a mathematical model of correlation between pollution and bioaccumulation. Results of the accumulation by mussels of cadmium, copper, lead, and mercury in the form of bivalent soluble ions in 5-500 ppb concentrations indicate that when a certain minimum pollution threshold is exceeded, the initial accumulation rate is proportional to the added pollutant and decreases in time to zero. An apparent accumulation equilibrium is reached which grows linearly and sometimes proportionally with the pollution level. The accumulation stage phenomena suggests an accumulation factor (AF) which is more representative of pollution than the concentration factor and is more useful for quantifying the affinity of metals to biological tissue in the following order: cadmium < lead < copper < mercury according to the elec-

tronegativity and the energetics of the chemical bond. The utility of AF depends on using mussels as fast and sensitive indicators of marine pollution for sufficiently low values of concentration and duration. (Auen-Wisconsin)
W74-10793

A COMPARISON OF THE PHOTOSYNTHESIS-LIGHT INTENSITY RELATIONSHIP IN PHYLOGENETICALLY DIFFERENT MARINE MICROALGAE,
Skidaway Inst. of Oceanography, Savannah, Ga.
W. M. Dunstan.
Journal of Experimental Marine Biology and Ecology, Vol 13, No 3, p 181-187, 1973. 3 fig, 16 ref.

Descriptors: *Photosynthesis, *Light intensity, *Marine algae, Phylogeny, Chlorophyll, Phytoplankton, Metabolism, Diurnal, Diatoms, Dinoflagellates, Chlorophyta, Chlorella, Scenedesmus.
Identifiers: *Coccolithophores, Amphidinium carteri, Cyclotella nana, Thallasiosira pseudonana, Isochrysis galbana.

Whether there are differences in one basic physiological characteristic of marine microalgae, namely, the photosynthesis-light intensity relationship was determined. Measured under equivalent physiological conditions, the photosynthesis-light intensity relationship based on oxygen production/mg chlorophyll a was found to be the same in five species representing the different chlorophyll c containing divisions of marine phytoplankton. Other non-photochemical metabolic processes related to photosynthesis such as diurnal variations, maximal photosynthesis rates, and dark oxygen uptake were quite different, and so these are the more significant factors in production and ecological distribution of diatoms, dinoflagellates, and coccolithophores. In contrast, the green algae tested showed a significantly different photosynthesis-light intensity curve from the chlorophyll c group. Based on the representative organisms tested there is no basic difference between diatoms, dinoflagellates, and cocclithophores in the photosynthesis process. The characteristics which are variable and can be associated with a particular species, phylogenetic group, or ecological race are those related to non-photosynthetic metabolic processes and non-photochemical reactions associated with, or reflected in, growth rates and photosynthesis saturation rates. These are the significant determining factors in production and ecological distribution. (Jones-Wisconsin)
W74-10795

ELIMINATION OF PHOSPHATE DETERGENTS AND PSYCHOLOGICAL REACTANCE,
Florida Univ., Gainesville. Dept. of Marketing.
M. B. Mazis, R. B. Settle, and D. C. Leslie.
Journal of Marketing Research, Vol 10, No 4, p 390-395, 1973. 6 tab, 14 ref.

Descriptors: *Phosphates, *Detergents, *Psychological aspects, *Florida, Attitudes, Marketing, Legislation.
Identifiers: *Psychological reactance theory, Miami(Fla), Tampa(Fla), No-phosphate detergents.

Consumers' reaction to elimination of phosphate laundry detergents was studied to determine if their attitudes toward laundry detergents and antiphosphate laws can be predicted by the psychological reactance theory as formulated by Brehm, to explain why many people respond negatively to any force which restricts their freedom of action. Two hypotheses were formulated about Miami consumers based on psychological reactance theory predictions: Miami consumers, who were prohibited by law from purchasing products containing phosphates, will express more positive attitudes toward laws prohibiting the sale of phosphate detergents. A comprehensive questionnaire was designed to determine consumers' attitudes about laundry detergents and related products, their opinions about laws regulating the use of phosphates, and their demographic characteristics. Miami and Tampa, Florida homogeneous population samples were interviewed simultaneously. Questioning revealed that all Miami consumers were aware that they were using a non-phosphate product. Differential attitudes expressed by product switchers and non-switchers can be attributed to reactance effects rather than to physical differences among the products used. (Jones-Wisconsin)
W74-10798

SOME CHARACTERISTIC FEATURES OF THE BACTERIAL DECOMPOSITION IN SEDIMENTS FROM LAKES AND PONDS IN SOUTHWEST GREENLAND (THE NARSSAQ AREA),
Copenhagen Univ. (Denmark). Inst. of Hygiene.
E. Fjerdingstad, and O. Berg.
Archiv fur Hydrobiologie, Vol 72, No 3, p 313-332, 1973. 7 fig, 4 tab, 40 ref.

Descriptors: *Bacteria, *Decomposing organic matter, *Sediments, Lakes, Ponds, Cellulose, Sulfur bacteria.
Identifiers: *Greenland(Narssaq).

The west Greenland lakes, where the influence of civilization is minimal, were investigated. Seventeen samples of sediment from lakes and ponds in the Narssaq area were examined bacteriologically, especially with a view to estimate cellulose decomposition and sulfur oxidation. The investigated area is situated on old geological formations. Some principal features of the climatic conditions are given. On the basis of examinations of mud from the River Tidal, it had been concluded that samples of mud yielded more reliable bacteriological evidence of the degree of faecal pollution than do water samples. Figures on the decomposition of cellulose are almost similar to those applying to many Danish Lakes, but the latter are not the maximum numerical values. Sulphur decomposition is insignificant as compared with most Danish lakes. The largest total sulphite reduction was ascertained for locality 6 (number of bacteria 4140/g). Sulphate reduction by Desulpho-vibrio desulfuricans appeared only in 8 samples out of the 17. Sulphur oxidation by members of the Thiobacillus family was ascertained only for three locations. (Jones-Wisconsin)
W74-10799

EFFECT OF WATER LEVEL FLUCTUATION ON LAKE VEGETATION,
Uppsala Univ. (Sweden).
N. Quennerstedt.
Verhandlungen Internationalen Vereiningung Limnologie, Vol 13, p 901-906, 1958. 2 fig, 8 ref.

Descriptors: *Aquatic plants, *Water level fluctuations, Lakes, Vegetation, Ecology, Benthic flora, Productivity.
Identifiers: *Zonation, *Sweden, *Lappland, Ronnback Lake(Sweden), Lake Gardiken(Sweden), Lake Hotagen(Sweden), Isoetes lacustris.

Water level fluctuation is important in the ecology of benthic lake vegetation, usually determining its zonation. In a natural lake the same seasonal water level variations recur so that zonal distribution of the different vegetation types is practically constant. Although a south Swedish lake shows the lower boundary of purely terrestrial vegetation as a distinct line, located at highest high water mark, it cannot be assumed that the same demarcation line in a north Swedish lake likewise corresponds to highest high water. Extreme high water can rise above this dividing line in many Lappland lakes without causing visible harm to the terrestrial vegetation. It is not clear how many days' submersion such land plants can stand. In Lake Hotagen there is a range of 3 m between controlled high water and low water causing pre-existing vegetation practically to disappear. Rooted vegetation is severely damaged, and all vascular plants exterminated, if the water level variations exceed a certain value. Considerable practical and financial problems have arisen in north Sweden as large increases in Sparganium species with long floating leaves, Ranunculus peltatus, etc., is likely to interfere severely with timber-floating operations and fishing. (Jones-Wisconsin)
W74-10801

DIURNAL PRIMARY PRODUCTION PATTERNS IN SEVEN LAKES AND PONDS IN ALBERTA (CANADA),
Calgary Univ. (Alberta). Dept. of Biology.
R. S. Anderson.
Oecologia (Berl.), Vol 14, p 1-17, 1974. 15 fig, 4 tab, 55 ref.

Descriptors: *Estimating, *Diurnal, *Primary productivity, Lakes, Ponds, *Canada, Surface waters, Solar radiation, Phytoplankton, Measurement.
Identifiers: *Alberta (Canada).

Relationships between production and insolation in lakes and ponds of different sizes and types were examined and relationship between daily production and short-term incubation assessed. A series of consecutive short-term experiments, using the C-14 radioisotope technique, indicated that diurnal primary production patterns were different for lakes and ponds. The upper 2 m of lakes showed marked early-morning and late-afternoon production maxima and midday depressions. Most lake series at depths over 2 m showed midday production maxima and a lag in the initiation of morning production. Relationship between fraction of total daily primary production and the fraction of total daily insolation for each incubation period was examined by calculating the correlation coefficients for these two sets of values. Estimation of total daily production by extrapolation from short-term midday production was fairly accurate for ponds but was less accurate and less consistent for lakes, especially in surface waters. Relative to solar radiation, extrapolations from short-term incubations near midday were likely to give underestimates to total daily net primary production. Difference in production patterns between lakes and ponds was likely due to differences in phytoplankton composition and greater seasonal and diurnal changes in physical and chemical conditions in the latter. (Jones-Wisconsin)
W74-10802

VERTICAL ENTRAINMENT INTO THE EPILIMNIA OF STRATIFIED LAKES,
Canada Centre for Inland Waters, Burlington (Ontario).
J. O. Blanton.
Limnology and Oceanography, Vol 18, No 5, p 697-701, 1973. 5 fig, 1 tab, 15 ref.

Descriptors: *Entrainment, *Epilimnion, *Stratification, Lakes, Mixing, Depth, Energy budget, Energy, Hypolmnion, Winds, Thermocline, Great Lakes, North America.
Identifiers: *Vertical entrainment.

Vertical entrainment and its effects on energetics and budgets was investigated in lakes with a wide geographical distribution in the northern temperate zone. Lakes are particularly suitable for studying entrainment because when local entrainments are integrated over the entire area, advective effects are eliminated and the problem is reduced to a single dimension. Entrainment rates in stratified lakes have practical significance because they may represent erosion and mixing of a hypolimnion having chemical and heat compositions different from those of the more turbulent

epilimnion. Entrainment of nutrients into the epilimnion could play a significant role by making nutrients available to algae, providing there was an adequate nutrient supply in the hypolimnion. Stratified lakes of widely different morphology show an inverse correlation between the average rates of water entrainment into the epilimnion and their average static stability during the period of epilimnion growth as long as wind energy input is the principal cause of the growth. The magnitude of entrainment depends to an extent on the lake's mean depth. Entrainment alters the potential energy of a lake and is one component of the mechanical energy budget. (Jones-Wisconsin)
W74-10803

PHOSPHATES IN SEDIMENTS OF PAMLICO ESTUARY,
North Carolina Univ., Chapel Hill. Dept. of Environmental Sciences and Engineering.
J. B. Upchurch, J. K. Edzwald, and C. R. O'Molia.
Environmental Science and Technology, Vol 8, No 1, p 56-58, 1974. 6 fig, 14 ref.

Descriptors: *Phosphorus, *Sediments, *Estuaries, Salinity, Iron, Freshwater, Clays, Silts, Absorption, *North Carolina.
Identifiers: *Pamlico Estuary(NC).

Amount of available phosphorus present in bottom sediments of North Carolina's Pamlico Estuary was plotted as a function of the distance downstream. The figure includes only those samples in which the percentage of clay and silt exceeded 85% and represents the changes from a freshwater to a saline environment. The term 'available phosphorus' refers to a fraction of the total phosphorus that is extracted using a procedure devised by Wentz and Lee. The amount of available phosphorus extracted from sediment samples was observed to decrease from 1.6 mg P/g sediment in fresh water to 0.3 mg P/g sediment in water with a salinity 18 ppt. The decrease in the available P and in the Fe-P correlation along the length of the estuary is consistent with the suggestion that P is held to suspended sediments by some type of Fe-inorganic P comples of limited stability. Suspended materials entering the estuary in the fresh water inflow could lose phosphorus to solution as they are transported through waters of increasing salinity to the mouth of the estuary. (Jones-Wisconsin)
W74-10804

PRIMARY PRODUCTION: FRESHWATER ECOSYSTEMS,
Cornell Univ., Ithaca, N.Y. Section of Ecology and Systematics.
G. E. Likens.
Human Ecology, Vol 1, No 4, p 347-356, 1973. 3 tab, 39 ref.

Descriptors: *Primary productivity, Freshwater, *Measurement, *Eutrophication, Lakes, Rivers, Marshes, Photosynthesis, Swamps, Phytoplankton, Streams, Aquatic plants, Productivity, Analytical techniques.
Identifiers: Net primary productivity.

Although their areal and volumetric extent is relatively small, freshwater ecosystems are among the most productive on earth. About 16% of these are the large inland lakes of North America. Several have recently undergone dramatic changes that restrict man's usage, primarily because human activities in their drainage basins accelerate nutrient input. Photosynthetic fixation of carbon in freshwater ecosystems may occur in various kinds of communities, which may be grouped and identified by type of producer organism--phytoplankton, macrophytes, and periphyton. A variety of environmental factors, including availability of light and nutrients, grazing, temperature and substrate, regulate or limit net primary production in these diverse and complex ecosystems. Carbon may be fixed within these systems by phytoplankton, macrophytes, periphyton, or chemosynthetic microorganisms, or may be carried in, primarily as detrital organic matter, from drainage basins. Evaluation of these inputs and their regulating factors is important for predicting eutrophication trends. Through cultural changes, man accelerates nutrient inputs into lakes--from agricultural fertilizer, sewage, detergents, industrial wastes, atmospheric pollution--and greatly increases their biological productivity. The value of this increase depends on the characteristics of the plants which proliferate. (Jones-Wisconsin)
W74-10805

COMPUTER MODELING OF SEDIMENT AND PHOSPHORUS MOVEMENT INTO CANADARAGO LAKE,
Cornell Univ., Ithaca, N.Y. Dept. of Agronomy.
For primary bibliographic entry see Field 5B.
W74-10807

THE FINE STRUCTURE OF THE PERIPHYTON OF CHARA SP. AND POTAMOGETON NATANS FROM WYTHAM POND, OXFORD, AND ITS SIGNIFICANCE TO THE MACROPHYTE-PERIPHYTON METABOLIC MODEL OF R. G. WETZEL AND H. L. ALLEN,
Oxford Univ. (England). Dept. of Zoology.
B. R. Allanson.
Freshwater Biology, Vol 3, No 6, p 535-542, 1973. 2 tab, 6 plates, 15 ref.

Descriptors: *Morphology, *Periphyton, *Chara, Aquatic plants, Metabolism, Biological communities, Systematics, Electron microscopy, Diatoms, Primary productivity.
Identifiers: *Potamogeton natans, Wytham Pond(England), Wetzel-Allen model.

A model has been proposed which interrelates the various components of submerged aquatic plants and their covering periphyton or 'Aufwuchs.' Optical microscopic methods are limited because of the three dimensional structure of the association. The scanning electron microscope technique has greatly increased understanding of the fine structure of external surfaces and its application to this particular problem has proven very successful. The fine structure of the complex which supports and provides confirmatory evidence of the essential validity of Wetzel and Allen's original hypothesis is discussed. The periphyton-Chara sp. complex from Wytham Pond, Oxford, England was chosen at it provided a rich source of material heavily impregnated with calcium carbonate derived from the photosynthetic activity of the algal complex in the hard water of the pond. To demonstrate the nature of the association, material was prepared for optical, scanning and transmission electron microscopy. Of particular note is the manner in which the loosely woven diatomaceous component is held in place by a stranded matrix formed largely from the gelatinous stalks of varied structures which in places extends as a fragmented membrane above the calcareous deposits covering the cell wall. (Jones-Wisconsin)
W74-10808

NUTRIENT RETENTION IN SALT MARSH PLOTS EXPERIMENTALLY FERTILIZED WITH SEWAGE SLUDGE,
Boston Univ., Woods Hole, Mass. Marine Biological Lab.
I. Valiela, J. M. Teal, and W. Sass.
Estuarine and Coastal Marine Science, Vol 1, No 3, p 261-269, 1973. 6 fig, 3 tab, 21 ref. NSF GA-28365, NSF GA-28272.

Descriptors: *Nutrients, *Retention, *Tidal marshes, *Fertilization, *Sewage sludge, Tides, *Salt marshes, Nitrogen compounds, Phosphorus compounds, Regression analysis, Nutrient removal.

Growing population on the NW Atlantic coast has increased the contamination of coastal wetlands with sewage wastes. Effects of sewage on salt marsh ecocystems by experimentally treating salt marsh plots with sewage sludge was studied. Plots 10 m in diameter were fertilized once every two weeks with commercially available sewage sludge and nutrient losses measured in ebbing tidal water. The experimental plots were located in basins drained by single small ditches to allow sampling of ebbing tidal water from each plot. Concentration of ammonia nitrogen, nitrate + nitrite nitrogen, nitrite nitrogen, phosphate phosphorus and total phosphorus, respectively, in water leaving the treated plots was measured. Sea water temperature negatively affected phosphate phosphorus losses. Principal losses were in the form of ammonium and phosphate and were related to dosage applied and height of tide following application. Salt marsh systems are sufficiently flexible to use as much nitrogen as is available regardless of the supply mechanisms. They may act as effective removers of excess inorganic nitrogen. Results suggest that adequately managed salt marshes may be considered as potential tertiary treatment systems for sewage effluent. (Jones-Wisconsin)
W74-10809

OBSERVATIONS ON THE LIMNOLOGY AND PRIMARY PRODUCTION OF A SMALL MAN-MADE LAKE IN THE WEST AFRICAN SAVANNA,
Sussex Univ., Brighton (England). School of Biological Sciences.
J. D. Thomas, and P. J. Ratcliffe.
Freshwater Biology, Vol 3, No 6, p 573-612, 1973. 25 fig, 5 tab, 2 plates, 74 ref.

Descriptors: *Africa, *Limnology, *Primary productivity, *Artificial lakes, Grasslands, Systematics, Temporal distribution, Physicochemical properties, Spatial distribution.
Identifiers: *Ghana(Accra).

Research effort on small, artificial lakes or reservoirs in West Africa can be justified due to their importance in development of agriculture and fisheries and as foci of parasitic diseases. An account is given of limnology and primary production of a small man-made lake in the coastal savanna of Ghana. Observations were made between June 1958 and March 1960 on meteorological conditions and physicochemical factors. Water volume and surface area rapidly reach maximum values in the wet season despite the low runoff values. Minimum values occur in the dry season. Annual cycle in water temperature follows that of solar radiation. The ionic content of the water is low and dominated by bicarbonate, sodium, silica, and iron. The oxygen pulse is strong and phytoplankton photosynthetic activity is high during the dry season, whereas in the wet season the converse is true. Rooted vegetation became permanently established in the fish pond but not in the lake itself. Primary production in the water column is mainly by Myxophyceae and Bacillariophyceae and is low during dry seasons and very low in the wet seasons. Reasons for the low primary productivity levels are discussed. (Jones-Wisconsin)
W74-10810

DERIVATION OF DAILY PHYTOPLANKTON PRODUCTION ESTIMATES FROM SHORT-TERM EXPERIMENTS IN SOME SHALLOW, EUTROPHIC AUSTRALIAN SALINE LAKES,
Monash Univ., Clayton (Australia). Dept. of Zoology.
U. T. Hammer, K. F. Walker, and W. D. Williams.
Australian Journal of Marine and Freshwater Research, Vol 24, No 3, p 259-266, 1973. 1 fig, 1 tab, 23 ref.

Descriptors: *Data collections, *Phytoplankton, *Productivity, Analytical techniques, Shallow water, Eutrophication, Saline lakes, Photosynthesis, Diurnal, *Australia.

Identifiers: *Short-term experiments.

Several experiments, involving a series of short-term exposures during which radiation data were recorded, are reported and relative efficacy of various conversion factors examined. Experiments were conducted in 1970 in three shallow, saline, eutrophic lakes near Colac in western Victoria. Measurement of phytoplankton production typically involves short-term (3-6 hr) experiments; some means of conversion is then applied to yield estimates of daily production. On the basis of C-14 experiments, several means of making such conversions are compared. Day-long (12 hr) exposures tended grossly to underestimate the 'true' daily production as measured by the cumulative results of consecutive short-term experiments. Conversions based on half-day exposures and on radiation data were about equally effective, although both may involve uncertainties of at least 25%. Conversion factors derived from short-term v. cumulative results varied seasonally and even over short periods of time, apparently in accord with variable biological and meteorological conditions. To minimize errors short-term experiments should include the midday period when possible. (Jones-Wisconsin)
W74-10812

TOXIC EFFECTS OF FRESHWATER TURBELLARIANS ON SCHISTOSOME MIRACIDIA,
Cincinnati Univ., Ohio. Dept. of Biological Science.
R. J. Glaudel, and F. J. Etges.
J Parasitol. Vol 59, No 1, p 74-76, 1973.
Identifiers: Cura-Foremanni, Dugesia-Dorotocephala, Dugesia-Tigrina, Gigantobilharzia-Huronensis, Phagocata-Morgani, Schistosoma-Mansoni, *Schistosome miracidia, *Turbellarians, *Toxicity, *Planarian worms, Biocontrol.

While previous work has shown that planarian worms have toxic action on trematode miracidia, the present study was designed to detect quantitative differences in such activity, using 4 different planarian species against 2 species of schistosome miracidia. Differences were detected on the basis of the duration of exposure required to kill or immobilize 50 plus or minus 10% of exposed miracidia. The planarians, Cura foremanni, Dugesia tigrina, D. dorotocephala and Phagocata morgani were each tested against miracidia of Schistosoma mansoni and Gigantobilharzia huronensis. D. dorotocephala was more toxic than C. foremanni, D. tigrina and P. morgani were least active and there was an apparent difference in susceptibility to such toxic action between S. mansoni and G. huronensis. These laboratory data suggest that careful selection of the most actively toxic species of planarian would be required if such organisms were to be employed as biological control agents against schistosome miracidia.--Copyright 1973, Biological Abstracts, Inc.
W74-10830

STUDIES ON THE EFFECTS OF THE ORAL ADMINISTRATION OF DI-(2-ETHYLHEXYL) PHTHALATE ON SOME HEPATIC ENZYMES IN THE RAT,
British Industrial Biological Research Association, Carshalton, Surrey (England).
B. G. Lake, S. D. Gangolli, M. G. Wright, P. Grasso, and A. G. Lloyd.
Biochemical Society Transactions, Vol 2, No 2, p 322-325, 1974. 2 tab, 5 ref.

Descriptors: *Water pollution effects, *Toxicity, Sea water, Laboratory tests, Laboratory animals, Animal physiology, *Animal pathology, Environmental effects, Rodents, Organic compounds.
Identifiers: Di-(2-ethylhexyl)phthalate, *Phthalate esters.

A toxicological study was conducted on the safety evaluation of di-(2,-ethylhexyl)phthalate, a commonly used phthalate ester, specifically investigating the biochemical and histochemical effects on the liver of rats after oral administration. Metabolic studies conducted on young male Wistar albino rats with the ester at single oral doses of 20 mg/kg and 2000 mg/kg and seven daily doses of 200 mg/kg, showed that 98-99 percent of the radioactivity was excreted within four days. The study of the hepatic effects was conducted in rats by the daily gastric intubation of the phthalate ester dissolved in corn oil, at a dosage of 200 mg/kg for 4, 7, 14, and 21 days respectively. The results of the study, showing that the effects of di-(2-ethylhexyl)phthalate on the rat hepatic mitochondrial and microsomal enzymes are not wholly reproducible by either phthalic acid or 2-ethylhexan-1-o1, indicate that other metabolites of di-(2-ethylhexyl)phthalate may contribute to the biochemical effects. (Sandoski-FIRL)
W74-10885

UPTAKE OF CHLOROBIPHENYLS BY OYSTERS,
Woods Hole Oceanographic Institution, Mass.
For primary bibliographic entry see Field 5B.
W74-10889

THE EFFECT OF NITRITES ON ISOLATION-INDUCED AGGRESSION IN MICE,
Hadassah Medical School, Jerusalem (Israel). Environmental Health Lab.
N. Gruener.
Pharmacology Biochemistry and Behavior, Vol 2, No 2, p 267-269, March-April, 1974. 2 tab, 6 ref.

Descriptors: *Laboratory animals, Potable water, *Nitrites, *Animal behavior, Laboratory tests, *Rodents, *Isolation, Water pollution effects.
Identifiers: *Sodium nitrite, Animal isolation, Mice, Agression(Animals).

Chronic administration of sodium nitrite, one gram per liter, in drinking water of pregnant mice and their offspring caused a significant increase in the isolation-induced agression of the male young. The cessation of administration of sodium nitrite reduced the agressive behavior of the experimental group to the control level. Since nitrates and nitrites are frequently ingested in human drinking water, health implications are cited. (Sandoski-FIRL)
W74-10892

ENVIRONMENTAL INFLUENCES ON OFFSHORE FACILITIES,
National Oceanic and Atmospheric Administration, Washington, D.C. Environmental Data Service.
For primary bibliographic entry see Field 6G.
W74-10898

ASBESTOS-LIKE FIBERS IN DULUTH WATER SUPPLY, RELATION TO CANCER MORTALITY,
National Cancer Inst., Bethesda, Md. Epidemiology Branch.
T. J. Masson, F. W. McKay, and R. W. Miller.
Journal of the American Medical Association, Vol 228, No 8, p 1019-1020, May 20, 1974. 1 tab, 6 ref.

Descriptors: *Water supply, *Asbestos, *Statistical methods, Industrial wastes, *Minnesota, Potable water, Water pollution effects.
Identifiers: *Cancer, *Carcinogenesis, *Duluth(Minn).

Asbestos-like fibers in industrial waste first entered the water supply of Duluth, Minnesota, in 1966. During the next 14 years, no carcinogenic effect was apparent in the patterns of cancer mortality among persons of all ages, or among children. However, the period of observation is short relative to the latent period for occupationally induced carcinogenesis from asbestos. A longer period of follow up than was possible in this study will be necessary before it can be concluded that there is no cancer hazard related to the drinking water supplies of Duluth and its neighboring communities. (Shaffer-FIRL)
W74-10900

5D. Waste Treatment Processes

WASTEWATER TREATMENT AND DISCHARGE SURVEY, OFFUTT AFB NE, OCT 1973,
Environmental Health Lab., Kelly AFB, Tex.
C. W. Bullock, and E. E. LeFebvre.
Available from NTIS, Springfield, Va. 22161 as AD-769 489, Price $4.75 printed copy; $2.25 microfiche. Air Force Environmental Health Laboratory Technical Report, 1973. 150 p, 23 fig, 35 tab, 16 ref, 9 append.

Descriptors: *Waste treatment, *Waste water treatment, *Waste water disposal, *Military reservations, *Nebraska, Surveys, Water pollution control, Sanitary engineering.
Identifiers: *Offutt Air Force Base(Neb).

An onsite survey of waste treatment was made of Offutt AFB, Nebraska 1-12 May 1972, to determine the quality and quantity of domestic and industrial wastewaters generated on base, determine the effectiveness of existing treatment facilities, and provide recommendations for treating the base's large volume of photographic processing wastes. Removal efficiencies for BOD and suspended solids in the plant meet current Nebraska criteria. However, recommendations were made to increase recirculation ratios and provide post-chlorination in order to improve plant treatment efficiency without requiring any major plant modifications. Industrial wastewaters from photographic processing, aircraft and equipment washing, and potable water treatment are discharged to Papillion Creek with little or no treatment. Improved pretreatment of these wastes with ultimate treatment and discharge through the domestic treatment system are recommended. (Knapp-USGS)
W74-10355

PORT COLLECTION AND SEPARATION FACILITIES FOR OILY WASTES, VOLUMES I-IV,
Harris (Frederic R.) Inc., New York.
R. L. Forster, J. E. Moyer, and S. I. Firstman.
Available from NTIS, Springfield, Va. 22161 as COM-73-11068-71, Price $6.75 printed copy; $2.25 microfiche. Frederic R. Harris, Inc., Consulting Engineers Final Contract Report MA-RD-900-73026, for the Maritime Administration, 1973 (4 vol). Total pages 877. Contract No 2-36202.

Descriptors: *Waste water treatment, Design, *Treatment facilities, *Oil pollution, *Water pollution control, *Harbors, *Oily water, Oil spills, *Separation techniques, Ships, Water pollution treatment.

Facilities for control of oil pollution of harbors are described. The types of oil wastes brought into selected ports by non-military shipping are identified. Estimates are given of quantities of oil wastes, based on total prohibition of overboard dumping. Designs for collecting, treating and disposing of the oil wastes with no additional environmental degradation are given for selected ports. The roles of Government are explored, the impact on shipping is evaluated and the overall viability of the concept discussed. It is intended that this report serve as a guide for any U.S. port contemplating a Port Collection and Separation Facility. (Knapp-USGS)
W74-10357

STATE OF THE ART REPORT ON MARINE SANITATION DEVICES,
Automation Industries, Inc., Silver Spring, Md. Vitro Labs. Div.
J. M. Rosenbusch.
Available from NTIS, Springfield, Va. 22161 as AD-768 682, Price $4.75 printed copy; $2.25 microfiche. Final Contract Report to US Coast Guard, June 1973. 157 p, 63 fig, 4 tab, 5 ref, 2 append. Contract DOT-CG-32785-A.

Descriptors: *Waste water treatment, *Sewage treatment, *Waste water disposal, *Ships, Sewage disposal, *Reviews, Research and development, Boats, Boating, Recreation, Recreation wastes.
Identifiers: *Marine sanitation devices.

A state-of-the-art study on marine sanitation devices (MSD) describes the problem of disposal of wastewater from recreational, commercial, and military vessels, with particular emphasis on recreational vessels. A summary of MSD's which are commercially available and a breakdown of MSD research, development, test and evaluation (RDT and E) programs being funded by the Federal government and private agencies are presented. Vessel limitations and constraints are analyzed and the suitability of the various MSD systems is compared to the vessel requirements. The major problems of wastewater treatment both onboard recreational, commercial, and military vessels and at dockside and the technical and economic factors that must be considered in the selection of a marine sanitation device are discussed. (Knapp-USGS)
W74-10360

MANAGEMENT OF URBAN STORM RUNOFF,
Water Resources Engineers, Walnut Creek, Calif., and Hydrologic Engineering Center, Davis, Calif.
M. B. McPherson, G. T. Orlob, D. F. Kibler, C. W. Chen, and R. P. Shubinski.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-234 316, $4.00 in paper copy, $2.25 in microfiche. American Society of Civil Engineers, Urban Water Resources Research Program Technical Memorandum No. 24, New York, N.Y., May, 1974, 92 p, 17 tab, 33 fig, 118 ref. OWRR C-4048(No 9009)(7).

Descriptors: *Urbanization, *Project planning, Pollution abatement, *Rainfall-runoff relationships, Pollutants, *Storm drains, Water pollution sources, Hydrograph analysis, Hydrologic aspects, Impaired water quality, Erosion control, Detention reservoirs, Computer models, Control systems, Estimated costs, Design storm, *Urban runoff, *Storm runoff, Storm water, *Urban drainage, Management, Cities.
Identifiers: *Stormwater treatment, Pollutographs, Receiving waters, Metropolitan studies, Storm sewer discharges, Combined sewer overflows.

The Hydrologic Engineering Center, Corps of Engineers, U.S. Army, sponsored a training course on 'Management of Urban Storm Water, Quantity and Quality' at its facilities in Davis, California, in February, 1973. Water Resources Engineers of Walnut Creek, California, conducted the course for the Center. This report contains eight of the fifteen course lectures, on the following topics: An Overview of Urban Storm Drainage; by G. T. Orlob; Hydrologic Effects of Urbanization and the Factors Controlling Urban Runoff, D. F. Kibler; Effects of Urban Runoff on Receiving Waters, by C. W. Chen; Concepts of Urban Storm Runoff Control, by R. P. Shubinski; Stormwater Treatment Process, by J. A. Lager; Storage of Urban Runoff, by J. A. Lager; Stormwater Treatment Versus Storage, by R. P. Shubinski; and, Design of Stormwater Drainage systems, by M. B. McPherson. Much of the content has not appeared elsewhere or is from limited-distribution project reports. Aside from its value as a unique information source, this report is suitable for use as a text or manual. Three other lectures are subsumed in a companion report that documents a computer model for preliminary evaluation of runoff-quality in metropolitan master planning. (See W74-10396) (McPherson-ASCE)
W74-10395

A MODEL FOR EVALUATING RUNOFF-QUALITY IN METROPOLITAN MASTER PLANNING,
Water Resources Engineers, Walnut Creek, Calif.; Hydrologic Engineering Center, Davis, Calif.; San Francisco City and County Dept. of Public Works, Calif.
L. A. Roesner, H. N. Nichandros, R. P. Shubinski, A. D. Feldman, and J. W. Abbott.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-234 312, $4.00 in paper copy, $2.25 in microfiche. American Society of Civil Engineers, Urban Water Resources Research Program Technical Memorandum No. 23, New York, N.Y., April, 1974, 73 p, 19 tab, 25 fig, 13 ref. OWRR C-4048(no 9009)(6).

Descriptors: *Urbanization, *Project planning, *Computer models, *Pollution abatement, *Rainfall-runoff relationships, *Feasibility studies, *Storm drains, Water pollution sources, Hyetographs, Forecasting, Detention reservoirs, Land use, Frequency analysis, Pollutants, Erosion, *Comprehensive planning, *California.
Identifiers: Master planning, *Metropolitan studies, *Stormwater treatment, Storm sewer discharges, Combined sewer overflows, User's manuals, San Francisco(Calif).

Documented is a computer model that should see extensive use in total-jurisdiction preliminary master planning for abatement of pollution from storm sewer discharges and combined sewer overflows. It is presently the outstanding tool available for that purpose. The computer program and a user's manual are available to the public. Water Resources Engineers (WRE) employed the initial version of the model in part of the development of the Department of Public Works, City and County of San Francisco, Master Plan for combined sewer overflow abatement, using 62-years of hourly rainfall data. WRE developed a more comprehensive version for The Hydrologic Engineering Center, Corps of Engineers, as part of a training course, the version documented. Examples of planning applications are included, together with samples of computer output for a San Francisco drainage area including summary and event statistics for rainfall, storage, overflow, treatment and quality. Data processing for planning applications is a much more practical consideration than the level of sophistication of hydrological process modeling, just the opposite of the emphasis required for design applications. Related management issues are presented in a companion report. (See W74-10395) (McPherson-ASCE)
W74-10396

ANALYSIS OF A DUAL MODE DESALINATION SYSTEM FOR NAVAL BASES,
Naval Civil Engineering Lab., Port Hueneme, Calif.
For primary bibliographic entry see Field 3A.
W74-10404

PLANNING AND WASTEWATER MANAGEMENT OF A COMBINED SEWER SYSTEM IN SAN FRANCISCO,
Colorado State Univ., Fort Collins. Dept. of Civil Engineering.
N. S. Grigg, W. R. Giessner, R. T. Cockburn, H. C. Coffee Jr., and F. H. Moss, Jr.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-234 334, $3.75 in paper copy, $2.25 in microfiche. Metropolitan Water Intelligence Systems, Technical Report No 10, June, 1973, 52 p, 15 fig, 28 ref, 2 append. OWRR C-4172(No 9028)(2).

Descriptors: *Control systems, *Sewers, *Storm runoff, *Overflow, Water pollution control, Storage, Detention, Reservoir operation, Computer applications, Systems engineering, Automatic control, Utilities, *California, *Combined sewers, Waste water treatment.
Identifiers: Urban water systems, Control logic, Wet weather control, Waste water management, *San Francisco(Calif).

A plan in San Francisco is described which recommends a control system for a combined sewer system. San Francisco's water quality management problems make an excellent case study for many aspects of this research investigation. The report is essentially a resource paper which abstracts the 3-volume San Francisco 'Master Plan for Wastewater Management', prepared in September 1971. Although this Master Plan has not yet been implemented, a great deal of the methodology developed and the data produced should be of value to urban water managers who face problems similar to San Francisco's. The criteria and procedure used in developing the 1971 Master Plan are presented. Skeletal portions of the data used and the descriptive features of the Master Plan itself are included. The goals of the work envisioned by the Master Plan are to solve three basic problems: water quality impairment by dry weather effluent, by wet weather overflows and drainage problems on city streets. From these goals the report shows the Master Plan procedures within the framework of a systems engineering process. The formulation of objectives, establishment of measures of effectiveness, formulation of alternatives, evaluation of alternatives and recommendation of a basic plan are demonstrated.
W74-10413

OPTIMIZATION TECHNIQUES FOR MINIMIZATION OF COMBINED SEWER OVERFLOW,
Dept. of Civil Engineering. Colorado State Univ., Fort Collins.
J. W. Labadie.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-234 331, $4.00 in paper copy, $2.25 in microfiche. Metropolitan Water Intelligence Systems, Technical Report No 11, June, 1973. 79 p, 5 fig, 30 ref, 1 append. OWRR C-4172(No 9028)(3).

Descriptors: *Control systems, *Sewers, *Storm runoff, *Overflow, *Optimization. Water pollution control, Operations research, Storage, Detention, Reservoir operation, Mathematical models, Algorithms, Computer applications, Systems engineering, Automatic control, Dynamic programming, Nonlinear systems, *Combined sewers, Waste water treatment.
Identifiers: Combined sewer systems, *Mathematical programming, Optimal control theory, Nonlinear programming, Decomposition.

Methods of developing control logic for automated operation of ambient and/or auxiliary storage capabilities within combined sewer systems, with the objective of minimizing overflows to receiving waters, are analyzed and evaluated. The enormous number of control opportunities requires that the control problem be formulated as an optimization problem. The problem is defined as one of minimizing total weighted overflows, subject to an assumed hydraulic model describing flow and storage dynamics, as well as other physical constraints. The optimization problem tends to increase in complexity and degree of nonlinearity as more realistic flow models are utilized. It is concluded that finite-dimensional optimization techniques appear to have greater potential for effective solution, over infinite-dimensional techniques (i.e., application of continuous-time optimal control theory). The primary reasons are (i) difficulty of obtaining solutions by the latter, (ii) operation of the real system in discrete time. Within the context of finite-dimensional optimization, an approximate-flow technique is presented

which significantly reduces the total number of variables involved in the problem.
W74-10415

AN ION-EXCHANGE PROCESS FOR RECOVERY OF CHROMATE FROM PIGMENT MANUFACTURING,
Mineral Pigments Corp., Beltsville, Md.
D. J. Robinson, H. E. Weisberg, G. I. Chase, K. R. Libby, Jr., and J. L. Capper.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-233 641, $4.50 paper copy, $2.25 in microfiche. Environmental Protection Agency, Cincinnati, Ohio, Technology Series Report EPA-670/2-74-044, June 1974. 91 p, 21 fig, 23 tab, 20 ref. 1BB036:ROAP 21 AZQ: Task 03 EPA Project 12020 ERM.

Descriptors: *Industrial wastes, *Ion exchange, *Pigments, Resins, *Waste water treatment, Adsorption, Treatment facilities, Chromium, Zinc.
Identifiers: *Chemical manufacturing wastes, Materials recovery.

Strongly basic ion-exchange resins have been shown to exhibit a preference for dichromate over many other anions in water solution. Laboratory studies were conducted to show that this ion preference could be used to remove chromate from waste waters which were discharged from a zinc yellow pigment manufacturing plant. It was also shown that the recovered chromate solution could be recycled into product manufacture without sacrificing product quality. From these laboratory studies, a full-scale ion-exchange treatment plant was designed, constructed, and demonstrated. The chromate composition of the plant effluent is being reduced from 2700 ppm to one to two ppm. The treatment system was designed to treat 60 gallons per minute of influent and to discharge an effluent which is within statutory limits for pH and for heavy metal content. The plant was designed to require minimal manual supervision. The steps in treatment and in resin regeneration are performed automatically and the control system is interlocked to make it fail safe. Operators are required only to make up regeneration solutions, to clean pump strainers and filters, to answer to alarms and occasionally to differentiate between turbidity and color as seen by a colorimeter. (EPA)
W74-10423

DEVELOPMENT OF A BATCHWISE IN-SITU REGENERATION TYPE SEPARATOR TO REMOVE OIL FROM OIL-WATER SUSPENSIONS,
Hydronautics, Inc., Laurel, Md.
D. Fruman, A. Gollan, and J. Ricklis.
Available from NTIS, Springfield, Va 22151 as COM-73-11109, Price $3.00 printed copy; $2.25 microfiche. Final Technical Report 7080-2, Phase II (Maritime Administration Report MA-RD-900-73025), February 1973. 111p, 39 fig, 13 tab. USDC-MA Contract C-0-35467, Phase II.

Descriptors: *Separation techniques, *Oily water, *Waste water treatment, Ships, Water pollution control, Filtration, *Foam separation.

An oil-water separator was designed, built, and tested on simulated oil-water suspensions. The system operates batchwise at 40 gpm. A section of 60 PPI polyurethane foam is situated in the central portion of the separator between two perforated plates. One plate is stationary and the other is free to move in order to squeeze the foam. The contaminated water enters the upstream section and is evenly distributed. The contaminated water flows through the foam, where the oil is retained or coalesced depending on the degree of saturation of the foam. The effluent leaving the filtration section is discharged into the downstream compartment of the separator where large droplets of coalesced oil are separated by gravity. At a certain level of oil saturation, the pressure drop across the foam increases to such an extent that filtration is no longer possible. The filtration is then stopped and regeneration of the foam is accomplished by squeezing with the moving perforated plate actuated by a hydraulic cylinder. Continuous filtration times as long as 14 hours were obtained with crude and No 6 fuel oils as contaminants. These periods exceed normal deballasting operation periods. Reticulated polyurethane foam is the most promising filter media having the best combination of scavenging and regeneration properties. (Knapp-USGS)
W74-10441

TEST AND EVALUATION OF OIL POLLUTION ABATEMENT DEVICES FOR SHIPBOARD USE, PHASE II,
Coast Guard, Washington, D.C. Naval Engineering Div.
L. B. Norton.
Available from NTIS, Springfield, Va 22161 as AD-762 499, Price $3.00 printed copy; $2.25 microfiche. October 1972. 22 p.

Descriptors: *Separation techniques, *Oily water, *Ships, *Oil pollution, Water pollution control, Equipment, Filters, Filtration, Pumps, Coalescence, *Waste water treatment.

Two filter-coalescer separators designed to remove oil from water were evaluated at a shore-based test facility. Freshwater and saltwater contaminated with various oils and dust, were used to simulate bilge and ballast processing conditions. One separator rated at 25 gpm produced an acceptable water effluent when tested with a low-emulsifying pump but proved unsatisfactory with a centrifugal pump. An improved 100 gpm separator produced an acceptable water effluent when tested with a centrifugal pump. The effluent was acceptable except for short periods of marginal performance which were noted during tests involving crankcase drainings. (Knapp-USGS)
W74-10444

PROCESS OF DEWATERING SEWAGE SLUDGE AND CONVERTING THE SAME TO A USEABLE PRODUCT,
Calspan Corp., Buffalo, N.Y. (assignee)
R. E. Baier.
U S Patent No 3,804,753, 2 p, 4 ref; Official Gazette of the United States Patent Office, Vol 921, No 3, p 1149, April 16, 1974.

Descriptors: *Patents, *Activated sludge, *Dewatering, *Wastewater treatment, Pollution abatement, Butanol, Sewage sludge, Sludge treatment.
Identifiers: *Chemical treatment.

The wet activated sludge is placed in a container of a particular shape. A water displacing ingredient, such as technical grade butanol, is distributed over the top of the sludge and water percolates through the sludge over a period of time. In addition to its water displacing function, it also provides sterilization of the sludge. The dehydrated sludge is receptive to infiltration with organic materials including organic monomers and other solid-precursor type chemicals, and may be converted to a useable product. (Sinha-OEIS)
W74-10445

CONTACT STABILISATION--A PROCESS WITH A FUTURE.,
Permutit Co. Ltd., London, (England). Pollution Control Dept.
J. E. Goddard.
Water Services, Vol 78, No 935, p 16-17, January, 1974.

Descriptors: *Sludge treatment, *Biochemical oxygen demand, Suspended solids, Water quality standards, Activated sludge, Aeration, Sewage treatment, Chemical oxygen demand, Nitrification, Waste water treatment.
Identifiers: *Contact stabilization, *United Kingdom(England).

The contact stabilization process, which was one of the earliest developments in the application of bichemical engineering to sewage treatment, is described. The process employs two aeration zones separated by a secondary clarification tank. Raw sewage and activated sludge are aerated together in the first zone, known as the contact zone, for a short period after which the mixed liquor is passed to the settlement stage. At this point the treated sewage can be discharged, being below the normal Royal Commission standard of 20/30 i.e., BOD5 less than 20 mg/liter and suspended solids less than 30 mg/liter. Most plants give an effluent of around the 10/15 standard. The sludge from the settlement stage is returned for further aeration before being mixed with more raw sewage in the contact zone. Such a plant is smaller than an equivalent conventional plant by a factor of nearly two. The development of the process was somewhat empirical but was based on the observation that the initial removal rates of organic matter by activated sludge was very high. The most important factor in the contact stabilization process is that the two phases of the reaction are separated and this leads to more efficient and quicker purification. (Merritt-FIRL)
W74-10451

WASTE NEUTRALIZATION CONTROL - DIGITAL SIMULATION SPOTS NONLINEARITIES,
Cincinnati Univ., Ohio.
J. D. Richter, C. D. Fournier, R. H. Ash, and S. Marcikic.
Instrumentation Technology, Vol 21, No 4, p 35-40, April, 1974. 8 fig, 8 ref.

Descriptors: *Model studies, *Hydrogen ion concentration, *Waste water treatment, Mathematical models, Treatment facilities, Control, *Neutralization, *Simulation analysis.
Identifiers: *Waste neutralization.

A generalized model of the effect of influent composition variations on pH control was designed to study performance in a treatment plant before installation of equipment. It was found that in the nonlinear situation there is no simple functional relationship between concentration of a single ionic species and pH. Equilibrium calculations based on mass balances for each component are required to predict the reasons. (Murphy-FIRL)
W74-10454

ANOTHER UNUSUAL SEWERAGE PROBLEM SOLVED WITH DUCTILE IRON PIPE,
For primary bibliographic entry see Field 8A.
W74-10455

INORGANIC NITROGEN REMOVAL IN A COMBINED TERTIARY TREATMENT-MARINE AQUACULTURE SYSTEM--I. REMOVAL EFFICIENCIES,
Woods Hole Oceanographic Institution, Mass.
J. C. Goldman, K. R. Tenor, J. H. Ryther, and N. Corwin.
Water Research, Vol 8, No 1, p 45-54, 1974. 5 fig, 6 tab, 34 ref.

Descriptors: *Recycling, Water conservation, Water pollution treatment, *Water reuse, Sewage treatment, *Tertiary treatment, *Food chains, Food webs, Ecosystems, Algae, Oysters, Nitrogen, *Waste water treatment, *Phosphorus.
Identifiers: *Nitrogen removal.

The transformations of nitrogen and phosphorus were observed during the Summer and Fall of 1972 in a prototype process consisting of growth systems for marine algae, oysters, and seaweed, joined in series and fed secondarily-treated wastewater diluted 1:4 with seawater for 11 weeks. Dur-

ing this time 95% of the influent inorganic nitrogen was removed by algal assimilation. Thy oysters in turn removed 85% of the algae, but regenerated as soluble ammonia 16-18% of the nitrogen originally bound in the algal cells. All of the regenerated nitrogen was removed in the seaweed system so that the total inorganic nitrogen removal efficiency of the system was 95%. Phosphorus removal was not nearly as complete as only 45-60% was removed. The process has the capability of being expanded to include additional trophic levels in an integrated and highly controlled food chain system to serve the dual function of tertiary wastewater treatment and waste recycling through the production of shellfish and seaweeds. (Merritt-FIRL)
W74-10462

PRESSURE SEWER DEMONSTRATION,
New York State Dept. of Environmental Conservation, Albany.
I. G. Carcich, L. J. Hetling, and R. P. Farrell.
Journal of the Environmental Engineering Division, American Society of Civil Engineers Vol 100, No EE1, p 25-40, Paper 10315 February, 1974. 5 fig, 4 tab, 17 ref.

Descriptors: *Sewers, Pipes, Engineering structures, *Drains, Sewage disposal, *Pumps.
Identifiers: *Gravity sewers, *Pressure sewers.

The pressurized wastewater collection concept was evaluated by installing 12 Grinder Pump (GP) units in a pressurized sewer system and observing their operation for a 13-month period. The wastewater was collected and conveyed in the normal manner by the building drainage system to the grinder pump unit's tank. From the grinder pump unit it was discharged through a 1 1/4 inch plastic pipe pressure lateral to an outside plastic pressure main, 1 1/4 to 3 inches in size. The pressure main received the macerated wastewater from all 12 units and discharged it into a gravity system within the city. The hydraulic design is a critical facet of any new pressure sewer system. Some grease accumulation can be expected, but when design velocities are kept between two fps and five fps, excessive accumulations apparently will be prevented. Commercially available shut-off valves should be installed immediately downstream on the discharge pipe in order that the GP unit can be isolated from the presure system for mainateance and repair work. The costs for the different components and installation can vary from $1620 to $3438 per unit deper.ding on specific needs. It is concluded that GP units are meant to be a supplemental tool in any wastewater collection system and not a replacement for the conventional (gravity-fed) wastewater collection system. (Merritt-FIRL)
W74-10463

DENITRIFICATION IN GRANULAR CARBON AND SAND COLUMNS,
National Environmental Research Center, Cincinnati, Ohio.
J. N. English, C. W. Carry, A. N. Masse, J. B. Pitkin, and F. D. Dryden.
Journal Water Pollution Control Federation, Vol 46, No 1, p 28-42, January, 1974. 13 fig, 5 tab, 1 ref.

Descriptors: *Pilot plants, Effluents, Waste treatment, *Sewage treatment, Carbon, *Denitrification, Chemical oxygen demand, Municipal wastes, *Waste water treatment.
Identifiers: *Granular carbon, *Sand columns, Regeneration.

The denitrification of secondary effluent in granular carbon and sand columns was investigated in a four stage, fixed bed, 0.3 mgd pilot plant. The effect of denitrification on column operation, COD removal efficiency, and carbon regeneration was determined. Supplementary nitrate was added to secondary effluent during two carbon column adsorption sequences to obtain average concentrations of 25.8 and 21.8 mg/liter NO3-N. There were removals of 80 and 92%, respectively, with most of the denitrification occurring in the first stage (10 minutes detention time) and 3-4 mg/liter NO3-N removed, without methanol in the subsequent stages. The methanol requirement was 1.9 times the NO3-N removed plus 1.1 times the dissolved oxygen removed. There was no significant impairment of the carbon's ability to remove COD in either adsorption sequence, and removals of 72% of COD in the first sequence and 66% in the second were within the expected range. Biological growth made backwashing necessary twice a day and headlosses average 30 to 50 psi after less than 12 hours of operation. The total cost of a 10 mgd plant using sand as the media was estimated at $71/million gallon. If denitrification is combined with dissolved organic removal in an activated carbon system, the additional cost for denitrification was estimated to be $25/million gallon. (Merritt-FIRL)
W74-10465

SMALL TOWN GETS AN EFFICIENT WASTE SYSTEM,
Male (C. T.) Associates, Schenectady, N.Y.
D. W. Geisinger, and M. A. Mastropietro.
Water and Wastes Engineering, Vol 11, No 1, p 32-34, January, 1974.

Descriptors: *Treatment facilities, *Activated sludge, *Anaerobic digestion, *Aeration, *Costs, Biochemical oxygen demand, Suspended solids, *Sewage treatment, New York, Municipal wastes, *Wastewater treatment.
Identifiers: *Niskayuna(NY).

The efficient secondary wastewater treatment facilities installed in Niskayuna, New York, are described. The new plant is rated at 1.5 mgd capacity, uses the conventional activated sludge process with anaerobic digestion of waste sludges, and supplements the original plant constructed in 1966. The improved facility consists of a coarse bar rack, aerated grit chamber, comminutor chamber, primary settling tanks (2), aeration tanks (2), parshall flume meter chamber, secondary settling tanks (2), chlorine contact tanks (2), air flotation thickener, anaerobic sludge digesters (2), and sludge drying beds. The existing primary settling tanks were converted to secondary settling tanks by minor modifications. A second anaerobic digester was added with floating gasholder to provide the added sludge handling capacity. The cost totaled $980,000 with construction amounting to $894,750. The plant serves approximately 5000 people, or 1/3 of the design population. The only problems with start up were grit removal and freezing in the winter. All secondary sludge was continuously returned at an average rate of 50%. Within two weeks, the MLSS was up to 2000 ppm, and BOD and suspended solids removal were in excess of 80 percent. In the first five months of 1973, BOD efficiency varied from 90-95%, while SS removal efficiency ranged from 89 97%. (Merritt-FIRL)
W74-10466

EFFECTS OF EQUALIZING WASTEWATER FLOWS,
Drexel Univ., Philadelphia, Pa.
M. D. LaGrega, and J. D. Keenan.
Journal Water Pollution Control Federation, Vol 46, No 1, p 123-132, January, 1974. 6 fig, 5 tab, 8 ref. EPA 14-12-598.

Descriptors: *Activated sludge, Municipal wastes, Municipal water, Treatment facilities, *New York, Efficiencies, Sanitary engineering, Aeration, *Biochemical oxygen demand, *Chemical oxygen demand, *Waste water treatment.
Identifiers: *Wastewater flow, *Newark(NY).

The effects of equalizing wastewater flows on treatment efficiency was investigated in a full scale study at the Newark, New York, activated sludge plant. The plant treats an average flow of approximately 1.8 mgd. The first phase of the study characterized plant operation during normal flow conditions by reducing the plant to marginal operating conditions. During the second phase the raw flow was diverted to the second aeration tank for equalization. The total volume of the equalization tank was 412,000 gallons with an effective depth of 12 feet. The raw wastewater in the equilization tank was aerated to prevent sedimentation and avoid septic conditions. The results of a diurnal sampling program indicate rather poor primary removals in the first phase. Overall removal of BOD approached 90 percent, while COD and SS removals were about 75%. Primary removals of BOD and COD were only 12%, while SS were reduced by 23%. The only substantial difference in phase two was in the SS and VSS data. If the influent to the primary clarifier is compared with the effluent, the SS removal efficiency was 47%. It is concluded that the most significant change of composition occurring in the equalization tank is the reduction in diurnal variability and maximum concentration. (Merritt-FIRL)
W74-10467

CHLORINE FOR EFFLUENTS IN SHORT SUPPLY,
P. S. Ward.
Journal Water Pollution Control Federation, Vol 46, No 1, p 2-4, January, 1974.

Descriptors: *Chlorine, Water treatment, *Disinfection, *Municipal water, *Wastewater treatment, Chlorination.

The chlorine shortage is discussed as it relates to the disinfection of wastewater effluent, and solutions are suggested. The total sanitary usage for chlorine for 1973 is estimated at 460,000 tons. Manufacturers prefer industrial contracts to municipal ones because many cities are restricted by their charters from advertising for contracts that extend longer than one year or provide for periodic price escalations. Municipal buyers frequently include requirements for free extras (as containers) in their bid forms. Legislation may be required to allow manufacturers to break long-term industrial contracts in order to fill sanitary chlorine requirements preferentially. Manufacturers are generally committed by contract to 100 percent of their production and cannot legally allocate any fractions off the top to municipalities. The current policy is to supply 1973 contractees again in 1974, allowing reasonable increases. The questions of how to handle either new users or greatly increased demands on the part of old users have not been resolved. (Merritt-FIRL)
W74-10468

SURFLEET SEWERAGE SCHEME,
Water Services, Vol 78, No 935, p 13-14, January, 1974.

Descriptors: *Sewage treatment, *Treatment facilities, Pumping plants, Filters, Topography, Sewers, Pipes, Sludge, Equipment, Tertiary treatment, *Wastewater treatment.
Identifiers: Surfleet(UK), *United Kingdom(England).

The design and construction of the Surfleet, England sewage works is described. Because of the typical fenland topography, the area is served by a system of sewers, incorporating six pumping stations and associated rising mains. The bulk of the sewage flow discharges into the first pumping station at the center of the village from which point it is pumped to the sewage treatment works. A total of 5500 m of 225 mm diameter and 150 mm diameter pipes were laid to serve an existing population of 845 persons. The sewers have been designed on the separate system so that storm water has been excluded as much as possible. A new sewage treatment works has been constructed to the North of the village and consists of inlet works, settlement

tanks, hoppers, pumping stations, filter beds, and humus tanks. Provision has been made for incorporating tertiary treatment in the future. (Merritt-FIRL)
W74-10469

STUDY ON THE REMOVAL OF INORGANIC AND ORGANIC MERCURY IN WASTE WATER BY THE FLOTATION METHOD,
Kyoto Univ.,(Japan). Dept. of Mineral Science and Technology.
S. Mukai, and Y. Nakahiro.
Memoirs of the Faculty of Engineering Kyoto University, Vol 35, No 4, p 361-380, October, 1973. 20 ref.

Descriptors: *Wastewater treatment, *Flotation, *Mercury, Chemical precipitation, Water pollution control, Hydrogen ion concentration, Investigations, Organic compounds, Inorganic compounds, Chlorine, Water purification.
Identifiers: *Mercury compounds, *Japan, Iron hydroxide, Sodium sulfide, Sodium thiosulfate.

The removal of inorganic and organic mercury in waste water by the flotation method was investigated as part of intensive studies of water pollution control. Inorganic mercury was efficiently removed by the Fe(OH)3 coprecipitation flotation method with 80 mg/liter cumulative addition of ferric ions in the pH about 0 after the third stage flotation using sodium oleate as a collector. Sodium sulfide was added to the waste water to completely precipitate the mercury. Organic mercury was removed by decomposing the compound containing the organic mercury into inorganic mercury with gaseous chlorine, followed by the Fe(OH)3 coprecipitation-flotation method and the Fe(OH)3 coprecipitation Na2S precipitation flotation method. The optimum conditions were at a pH below 1. The removal of excess chlorine in the flotation pump is important for a sucessful flotation of the precipitates. The excess chlorine was eliminated by 8 g/liter sodium thiosulfate or aeration over 40 min. Mercury decomposed by C12 gas was completely removed by the flotation method with an addition of 50-100 mg/liter ferric ions and 1 equivalent of sodium sulfide to the total amounts of mercury at pH 5.0-9.5. (Merritt-FIRL)
W74-10470

LONGBRIDGE SEWAGE TREATMENT WORKS.
Water Services, Vol 78, No 936, p 44-47, February, 1974.

Descriptors: *Sewage treatment, *Treatment facilities, Sludge treatment, Dewatering, Water quality standards, Effluents, Filtration, Flow, Sedimentation, *Biological treatment, Pumping plants, Filters, *Waste water treatment.
Identifiers: Warwick(UK), Leamington Spa(UK), *United Kingdom(England).

The design and operation of the new joint sewage works at Longbridge for the Boroughs of Warwick and Leamington Spa, England are described. The works replaces the existing Warwick sewage works and will treat up to 60% of the flow from Leamington Spa. The works operates on the double filtration system of treatment involving two successive applications of settled sewage on to two sets of biological filters with intermediate sedimentation. The facilities consist of the following: inlet unit, flow separation and storm sewage treatment, primary sedimentation tanks, high level pumping station and main control room, primary filters and humus tanks, secondary filters and humus tanks, outfall, and sludge dewatering plant. The plant will meet the effluent standards prescribed by the Severn River authority. (Merritt-FIRL)
W74-10471

OXYGEN ACTIVATED SLUDGE SELECTED BY PHILADELPHIA,
Philadelphia Water Dept., Pa. Water Pollution Control Div.
M. D. Nelson.
Civil Engineering (American Society of Civil Engineers), Vol 44, No 4, p 42-45, April, 1974. 3 fig, 1 tab.

Descriptors: *Waste water treatment, *Pilot plants, Design criteria, *Activated sludge, Effluents, Aeration, Planning, Municipal wastes, Treatment facilities, Oxygen, *Pennsylvania.
Identifiers: *Philadelphia(Penn), *Oxygen activated sludge, Physical-chemical plants, Effluent standards.

The Philadelphia Water Department compared three different pilot treatment facilities at one site. These were an oxygen activated sludge unit, a conventional activated sludge unit, and a physical-chemical plant. Design criteria for the future were determined. It was felt that either biological plant could meet the effluent standards with the air plant giving more marginal performance. The oxygen activated sludge plant was also slightly lower in installed and operating costs. In a proposed site plan for the future plant, aerator tanks using pure oxygen will be placed downstream of existing primaries. The expanded plant will be highly automated, with on-site direct digital computer to monitor all processes of plant operation. (Prague-FIRL)
W74-10472

PHYSICO-CHEMICAL TREATMENT OF STRONG MUNICIPAL WASTEWATER,
Technion--Israel Inst. of Tech., Haifa. Environmental Engineering Labs.
M. Rebhun, and S. Streit.
Water Research, Vol 8, p 195-201, March 1974. 3 fig, 5 tab, 14 ref.

Descriptors: *Municipal waste water, *Biochemical oxygen demand, *Chemical oxygen demand, *Waste water treatment, Suspended solids, Effluents, Phosphates, Fats, Carbohydrates, Organic acids, Flocculation, Clarification.
Identifiers: *Physico-chemical treatment, *Israel.

Direct chemical flocculation--clarification of strong new waste water followed by adsorption on activated carbon has been investigated. The fate of specific organic components (low organic acids, carbohydrates, proteins, fats as well as BOD and COD) in the chemical treatment process was also studied. Excellent removals of phosphates, fats and suspended solids and a clear effluent were obtained in the chemical treatment. The clear 'primary chemical' effluent is, however, of high soluble organic content, the largest fraction being the soluble (low) organic acids and carbohydrates. Adsorption of the chemically treated waste water on activated carbon gave a 60 percent removal and a final effluent of a relatively high organic content including BOD. The high concentration of remaining organics is ascribed to poor adsorbability of the low organic acids anions on activated carbon. (Prague-FIRL)
W74-10473

COMPUTER OPERATED SEWAGE TREATMENT AT NORWICH.
Effluent and Water Treatment Journal, Vol 14, No 2, p 79, February, 1974.

Descriptors: *Sewerage, *Treatment facilities, *Administration, Waste water treatment, *Sewage treatment, Sludge digestion, Sludge disposal, Effluents, Solid wastes, Maintenance.
Identifiers: Norwich(UK), *United Kingdom(England).

The annual report of the City of Norwich Sewage Purification Works is summarized. Figures are given for total volume of sewage received at the works during the year, the average daily volume of raw sludge removed from the sedimentation tanks, average rate of application of settled sewage to biological filters, average daily volume of recirculated final effluent, solids loading of the sludge digestion plant, overall average reduction in total solids fed to the digestion plant, and the average daily flow of trade effluent. The final effluent quality failed to comply with the River Authoritys relaxed limits for most of the year. It was anticipated that the commissioning of four new humus tanks late in 1972 would contribute to some improvement. (Merritt-FIRL)
W74-10474

RESPIRATION AND DENITRIFICATION STUDIES ON LABORATORY AND WORKS ACTIVATED SLUDGES,
Upper Tame Main Drainage Authority, Birmingham (England).
G. W. Clayfield.
Water Pollution Control, Vol 78, No 1, p 51-76, 1974. 13 fig, 20 tab, 46 ref.

Descriptors: *Activated sludge, *Respiration, *Denitrification, Investigations, Biochemical oxygen demand, Sludge treatment, Nitrogen, Ammonia, Chemical oxygen demand, Equipment, Sewage bacteria, *Waste water treatment.
Identifiers: *Dehydrogenase activity, *United Kingdom(England).

The respiratory, denitrifying, and dehydrogenase activities of activated sludges from full scale and laboratory scale plants were investigated. The activated sludges were always washed to remove soluble and weakly absorbed substrates. Synthetic sewage was used to facilitate comparison of the estimated potential activities of the sludges. Measurement of carbonaceous metabolic activity, nitrification and denitrification of activated sludges from the various sources made the examination of the interrelationship and dependence on operating variables such as BOD possible. An attempt was also made to account for oxygen uptake and to use the relationship obtained to suggest a means of estimating the quantity of surplus activated sludge produced during treatment. Among the conclusions are these: it is advantageous to operate at low loadings; denitrifying ability tends to fall with decreasing BOD loading; endogenous repiration is a variable and depends upon the history of the sludge; respiration rates support the view that conventional activated sludges are low in viable bacteria; and respiration rate measurements could profitably be included in the examination of activated sludge. (Merritt-FIRL)
W74-10475

COMPUTERISED SEWERAGE SCHEME.
Measurement and Control, Vol 7, No 3, p 83-84, March, 1974.

Descriptors: *Computers, *Sewerage, Treatment facilities, Automatic control, Sewage treatment, Data collections, Water pollution control, Waste water treatment.
Identifiers: *United Kingdom(England).

The computerized sewerage scheme which serves the Borough of Motherwell and Wishaw in Lanarkshire, England is described. It consists of a new main sewage works with a processing capacity of 682,500 cu m/day of raw sewage and two outlying works with capacities of 68,200 cu m/day and 6800 cu m/day. All three works are supervised through a computerized telemetry and control system. The system provides a high degree automatic control for two works each of which are controlled on three push buttons. Without the facilities of the computer based system, 298 push buttons would have been needed for control of the outlying works. A major feature of the control system philosophy is the amount of information processing carried out by the computer. The plant is run on the management by exception principle;

only information about deviations from normal are presented to the operator. The control system will also initially be used in a data gathering mode to amass information about the performance of the plant in a variety of situations. (Merritt-FIRL)
W74-10476

TECHNICAL TOUR FEATURES LULU ISLAND SEWAGE PLANT,
Water and Pollution Control, Vol 112, No 3, p 26-27, March, 1974.

Descriptors: *Treatment facilities, *Sewerage, *Canada, Sewers, Sewage treatment, Biochemical oxygen demand, Suspended solids, Sludge, Pumping plants, Equipment, Dewatering, Sludge treatment, Construction, Operation, Costs, *Waste water treatment.
Identifiers: *Lulu Island(Vancouver-Canada).

The design and operation of the Lulu Island sewage plant of Greater Vancouver, Canada are discussed. The treatment plant serves an area of over 16,000 acres with a system of lateral sewers draining to local pump stations and pumping through shallow force mains to a trunk sewer. The plant was designed for an average dry weather flow of 13.45 mgd in 1980, with provisions for expansion to handle 29 mgd by 2021. The plant was designed to reduce BOD of the sewage by a minimum of 35% and to reduce suspended solids by a minimum of 60%. Primary treatment includes influent sampling, prechlorination, pumping from a subsurface wet well to an above ground screen room housing multiple barminutor units, preaeration and grit removal, sedimentation, sludge removal followed by thickening, dewatering, incineration, and sterile ash disposal. Post chlorination in chlorine contact tanks has a one hour detention time and automatic chlorine residual control. There is provision for sampling and metering of effluent. The plant was also designed to accommodate possible future construction of secondary treatment facilities. (Merritt-FIRL)
W74-10477

DOMESTIC WASH WATER RECLAMATION FOR REUSE AS COMMODE WATER SUPPLY USING A FILTRATION--REVERSE OSMOSIS SEPARATION TECHNIQUE,
National Aeronautics and Space Administration, Langley Station, Va. Langley Research Center.
J. B. Hall, Jr., C. E. Batten, and J. R. Wilkins.
Report No NASA TN-D-7600, April, 1974. 34 p, 3 fig, 9 tab, 17 ref.

Descriptors: *Reverse osmosis, *Filtration, *Water reuse, Water supply, Potable water, Phenols, Carbon, Chlorine, Chlorination, Water purification, Sewage bacteria, Investigations, Evaluation, *Waste water treatment, Water conservation, Water pollution, Domestic wastes, Operation, Water quality standards.
Identifiers: *Commode water supply, Methylene blue, Chloroform.

A combined filtration reverse osmosis water recovery system was evaluated to determine its capability to reclaim domestic wash water for reuse as a commode water supply. The system produced water that met all chemical and physical requirements established by the U. S. Public Health Service for drinking water with the exception of carbon chloroform extractables, methylene blue active substances, and phenols. It is thought that this water is of sufficient quality to be reused as commode supply water. The filters were not capable of removing particles less than 1 micron in size from the waste water. The process rate of the reverse osmosis unit was degraded by approximately 46.9% for the 2.7 cu m of filtered wash water processed. Treatment of the process water with 5 ppm chlorine was sufficient to reduce the microorganisms in the commode tank to zero. Efficient dissemination of chlorine was required in order to rapidly inhibit microorganisms in the processed water tank. The use of the combined process for wash water recovery will require a maintenance filter to remove solid materials including those less than 1 micron in size from the wash water. The reverse osmosis module, if sufficiently protected from plugging, is an attractive low energy technique for removing contaminants from domestic wash water. (Merritt-FIRL)
W74-10478

ENHANCED NITRIFICATION BY ADDITION OF CLINOPTILOLITE TO TERTIARY ACTIVATED SLUDGE UNITS,
North Carolina Univ., Chapel Hill. Dept. of Environmental Sciences and Engineering.
R. C. Sims, and L. W. Little.
Environmental Letters, Vol 4, No 1, p 27-34, 1973. 2 fig, 2 tab, 15 ref.

Descriptors: *Nitrification, Water treatment, *Sorption, *Activated sludge, Oxidation, Bacteria, *Zeolites, *Waste water treatment, Tertiary treatment.
Identifiers: *Hector Clinoptilolite.

A new technique for improving the efficiency of the nitrification process in the treatment of wastewater is based on the surface sorption property of a natural zeolite, Hector Clinoptilolite. The process utilizes the zeolite as a solid phase in an activated sludge unit. The zeolite selectively sorbs ammonium ions from wastewater and therefore provides an ideal surface for the attachment of nitrifying bacteria which oxidize ammonium ion to nitrate ion. The removal of the adsorbed ammonium ion from the zeolite by nitrifying bacteria allows regeneration of the zeolite surface and thus enables the same zeolite to be used repeatedly. (Merritt-FIRL)
W74-10479

WATER AND POLITICS IN COASTAL CALIFORNIA - THE DIABLO CANYON EXPERIENCE,
Washington Univ., Seattle. Dept. of Political Science.
K. N. Lee.
Science and Public Affairs, Vol 30, No 2, p 29-35, February, 1974.

Descriptors: Water treatment, *Municipal water, *Desalination, Treatment facilities, *California, Social impact, *Social values, *Nuclear powerplants, *Recycling, *Waste water treatment, Political aspects.
Identifiers: *Diablo Canyon(Calif).

The relationship between public utilities and public opinion is illustrated through a discussion of the Diablo Canyon desalting facility of central California. The primary capacity of the plant would have been the production of fresh water. One of its secondary capacities would have been to use some waste heat from a neighboring nuclear power plant. Less desirably, the desalting plant would have altered the pattern of land use on its small part of the California coast. The plant would have been a strong incentive for population growth and would have provided important engineering and technical benefits in terms of water decontamination and in giving the United States a valuable advantage in international technical assistance. Environmental groups opposed the desalting plant and aroused public opinion to the extent that the voters passed an initiative requiring close scrutiny of future coastline development plans. Eventually, the federal government cancelled the construction of the plant due to budget restrictions and the announcement of construction of a similar plant in Hong Kong that would provide equivalent learning benefits to the engineering community. The project failed because it did not recognize that utilities have social consequences and responsibilities that cannot be ignored. (Merritt-FIRL)
W74-10480

NTA REMOVAL IN SEPTIC TANK AND OXIDATION POND SYSTEMS,
California Univ., Berkeley. Sanitary Engineering Research Lab.
S. A. Klein.
Journal Water Pollution Control Federation, Vol 46, No 1, p 78-88, January, 1974. 11 fig, 2 tab, 12 ref.

Descriptors: Leaching, *Septic tanks, *Biodegradation, *Pilot plants, *Nitrogen compounds, *Oxidation lagoons, *Waste water treatment, *Nitrilotriocetate.
Identifiers: *Leaching fields.

The biodegradability of trisodium nitrilotriacetate (NTA) in pilot scale septic tanks and leaching field systems was investigated to determine its potential as a replacement for phosphate builders in synthetic detergents. The removal of NTA averaged 21.8, 23.3, 23.1 percent in three septic tanks during the nine months of operation. Effluents from the septic tanks flowed into percolation fields contained in a four-compartment box. Five to seven weeks were required for biological slimes to develop and become acclimated to NTA in the fields. In normal aerobic percolation fields all the NTA was essentially degraded from influents containing concentrations up to 60 milligrams/liter. Totally anaerobic fields degraded ten percent NTA, but under nearly anaerobic conditions NTA degradation was virtually 100 percent. The presence of NTA had no noticeable effect on performance of septic tank percolation fields or sewage treatment systems. In aerobic soil columns, NTA was nearly 95 percent degraded from influent concentration of 40 and 100 milligrams/liter. In anaerobic soil columns, degradation ranged from 10-15 percent for the three influent NTA concentrations examined. In oxidation ponds, after a two-month acclimation period, steady state removal of NTA was in excess of 90 percent when influent concentrations were in the range normally expected in wastewater. (Merritt-FIRL)
W74-10481

SEWAGE LIFT STATION GAS TRAP,
R. E. Wilson.
U.S. Patent 3,807,901. Issued April 30, 1974. Official Gazette of the U.S. Patent Office, Vol 921, No 5, p 1997, April 30, 1974. 1 fig.

Descriptors: *Patents, *Sewage, Sewers, Effluents, Pressure, Equipment, *Gases, Odor, *Waste treatment.
Identifiers: *Sewer gas, Sewage lift station.

A sewage lift station includes a variable volume breathing assembly which normally isolates the interior of the sewage tank from the surrounding atmosphere and eliminates the escape of offensive gas. The assembly traps the sewer gas in the tank as the effluent level rises and falls between predetermined limits. This effects relatively innocuous venting of a portion of the sewer gas from the tank to the atmosphere if excessive amounts accumulate over a period of time or if an abnormal rise in the effluent level occurs resulting in a rise in the pressure of the trapped gas exceeding ambient atmospheric pressure. (Prague-FIRL)
W74-10483

PROCESS FOR THE TREATMENT OF ACTIVATED SLUDGE,
Komline-Sanderson Engineering Corp., Peapack, N.J.
T. R. Komline, Sr.
U.S. Patent 3,803,806. Issued April 16, 1974. Official Gazette of the U.S. Patent Office. Vol 921, No 3, p 913, April 16, 1974. 1 fig.

Descriptors: *Patents, *Activated sludge, *Sewage sludge, *Waste water treatment, *Gases, Heat.

Hot flue gases containing suspended solid particles, oxygen and other water soluble and insoluble components are injected beneath the surface of sewage sludge. Heat and the above components are transfered from the gases to the sludge, providing oxygen for activating the sludge. (Murphy-FIRL)
W74-10486

PROCESS FOR REGENERATING SPENT ACTIVE CARBON IN A SUSPENSION-DISPERSION TRANSPORT SYSTEM,
FMC Corp., New York.
R. T. Joseph.
U.S. Patent 3,801,514. Issued April 2, 1974. Official Gazette of the U.S. Patent Office, Vol 921, No 1, p 306, April 2, 1974. 1 fig.

Descriptors: *Patents, *Activated carbon, Carbon dioxide, Steam, Sewage treatment, Heating, Suspension *Waste water treatment.
Identifiers: *Regeneration, *Suspension-dispersion transport system.

A process for regenerating spent active carbon in a suspension dispersion transport system is described. The carbon, recovered from secondary sewage treatment and from beer and augar refining, is regenerated by rapidly heating it in the dip dispersed phase in the presence of an activating atmosphere. The activating gases are preferably steam or carbon dioxide or both. (Merritt-FIRL)
W74-10487

DEVICE FOR CONTINUOUSLY TREATING LIQUIDS,
Steinmuller (L. and C.) G.m.b.H., Gummersbach (West Germany).
G. Plura.
U.S. Patent 3,802,568. Issued April 9, 1974. Official Gazette of the U.S. Patent Office, Vol 921, No 2, p 593, April 9, 1974. 1 fig.

Descriptors: *Patents, *Ion Exchange, Equipment, *Design data, *Waste water treatment.
Identifiers: Germany.

A trisectional device for continuously treating fluids in an ion exchange bed is described. The device consists of a column like hollow body, the ends of which are closed off with lid like elements, distribution elements within the device, supply and discharge conduits for the fluid, the fluid, the fluid treating medium, and tubes within the hollow body and parallel to its longitudinal axis. The free ends of the tubes are firmly connected with intermediate plates. The uppermost tube is provided with cutouts extending all the way through. A smaller tube is concentrically arranged within the uppermost tube and flows into cutouts preferably radially extending through the uppermost tube. In the treating area of the middle bed section the tubes continue as solid rods, again forming tubes in the lower bed section. Cutouts are provided in the connecting region between the solid rod and the lower tube section. (Merritt-FIRL)
W74-10489

WATER PURIFYING DEVICE,
Matsushita Electric Industrial Co., Ltd., Osaka (Japan).
S. Sasaki, and T. Nishikawa.
U.S. Patent 3,802,563. Issued April 9, 1974. Official Gazette of the U.S. Patent Office, Vol 921, No 2, p 592, April 9, 1974. 1 fig.

Descriptors: *Patents, *Water purification, *Filters, *Filtration, *Municipal water, Design data, *Valves, Equipment, *Waste water treatment.
Identifiers: Japan.

A water purifying device is described which consists of a filter unit with a filter element within it and a purified water discharge tube connected to it. There is a directional control valve unit with two water outlet ports and an externally operable valve ball. A hose connects one of the water outlet ports with the filter unit. The directional control valve is mounted on a faucet and the valve ball is externally operated to alternately open and close the water outlet ports to obtain purified, city water. (Merritt-FIRL)
W74-10492

PROCESS FOR REMOVAL OF ORGANIC CONTAMINANTS FROM A FLUID STREAM,
AWT Systems, Inc., Wilmington, Del.
G. Sutherland.
U.S. Patent 3,803,033. Issued April 9, 1974. Official Gazette of the U.S. Patent Office, Vol 921, No 2, p 704, April 9, 1974. 1 fig.

Descriptors: *Patents, *Organic matter, *Waste water treatment, Iron, Carbon, Dispersion, Adsorption, Filters, *Filtration.
Identifiers: *Magnetic complexes, *Iron-carbon complex.

A process for the removal of organic contaminants from a fluid stream is described. A magnetically susceptible iron carbon complex is dispersed in the stream until a substantial amount of contaminants have been adsorbed from the stream. The dispersion passes through a magnetic filter to separate the dispersion into a fluid stream having a reduced concentration of contaminants and an adsorbed complex containing contaminants. Regeneration of the adsorbed complex may be accomplished by heating the complex in an inert atmosphere at a temperature sufficient to desorb and vaporize the contaminants. (Merritt-FIRL)
W74-10493

SAFETY INSTALLATIONS FOR THE PREVENTION OF POLLUTION THROUGH LEAKAGE IN A PIPELINE,
G. F. Wittgenstein.
U.S. Patent 3,802,456. Issued April 9, 1974. Official Gazette of the U.S. Patent Office, Vol 921, No 2, p 563, April 9, 1974. 1 fig.

Descriptors: *Patents, *Pipes, *Pollution abatement, *Engineering structures, Environmental engineering.
Identifiers: *Pipe covers.

A safety installation for protecting the environment from leakages in pipelines comprises a fluid-tight jacket which surrounds the pipeline and forms an intermediate space containing inserts which are separated by ducts sealed with a liquid or gas. The inserts are joined together by cables or wires and there is provided at least one tank towards which the leakage liquid flows through the ducts. A liquid leakage detector acts to remotely control the pumps and valves of the pipeline. The jacket is formed from short rigid runs connected by flexible joints; breaks between the runs contain separation bands and are covered by a flexible fluid-tight structure resting on the inserts and projecting onto the ends of the runs. The length of one run in the curves of the line is proportional to the radius of curvature of the contained pipe. At least one insert is grooved externally, and adjacent longitudinal edges of the jacket are distorted by a tool and then turned down into the groove. Thus, connection between the edges and the groove is fixed position and made fluid-tight by filling the groove with a mass which solidifies on drying. A means is provided to enable the sections of the inserts to deform to a variable extent along the inserts in the curves of the line. These inserts mainly rest on the inner wall of the runs. (Murphy-FIRL)
W74-10494

PROCESS AND APPARATUS FOR THE SEPARATION OF LIQUID MIXTURES,
R. C. Rishel.
U.S. Patent 3,804,252. Issued April 16, 1974. Official Gazette of the U.S. Patent Office, Vol 921, No 3, p 1027-1028, April 16, 1974. 1 fig.

Descriptors: *Patents, *Separation techniques, *Specific gravity, *Liquid wastes, Equipment, *Waste water treatment, Oily water.
Identifiers: Gravity separation, Settling.

A process and apparatus for the separation of liquids of different specific gravities are described. A horizontal cylindrical tank is divided into compartments, into one of which the mixture to be separated is introduced, forms distinct layers, and flows over a weir into a second compartment. The heavier, lower layer enters at a point remote from the inlet of the mixture into the first compartment, into a conduit which directs the heavier liquid through a hydraulic trap into a third compartment. The heavier liquid is maintained at a level lower than that of the mixture of the liquids in the initial settling compartment and subsequently removed. (Merritt-FIRL)
W74-10495

SUCCESSFUL APPLICATION OF GRANULAR CARBON SOLVES QUALITY PROBLEMS,
Paris Water Works.
R. Bowling.
Public Works, Vol 104, No 12, p 70-71, December, 1973.

Descriptors: *Water quality, *Filtration, *Kentucky, Treatment methods, Odor, Taste, *Activated carbon, Costs, Waste water treatment.
Identifiers: *Granular carbon.

The successful application of granular carbon in the four filters at the 1.5 mgd water treatment plant at Paris, Kentucky is described. Off taste and odor appeared at Paris irregularly and could last from a day or two to a week or more. Efforts to pinpoint the source of the trouble were never completely successful. The plant had previously used powdered carbon, but switched to granular because the granular appeared to offer a more efficient use of adsorptive capacity of the carbon, decreased need for monitoring the raw water, no capital expenditures requirements and suitable hydraulic characteristics. During a two-week period 50,000 pounds of granular activated carbon were loaded into four filters, each of 275 square feet. The carbon/sand combination of dual media filtration increased the filter capacity. The number of backwashes is less, but the volume of water used is not as low as the frequency would indicate because the filters are washed somewhat longer than before. At 8 and 12 months the measurement of carbon bed depth revealed no measurable loss of carbon due to the backwashing. The minimum life of the carbon is estimated at three years; it costs each of the 9,000 customers a fraction of a cent per day for a dramatic improvement in water quality. (Merritt-FIRL)
W74-10496

DRUG RESISTANT COLIFORMS CALL FOR REVIEW OF WATER QUALITY STANDARDS,
National Inst. for Water Research, Pretoria (South Africa).
W. O. K. Grabow, O. W. Prozesky, and L. S. Smith.
Water Research, Vol 8, No 1, p 1-9, 1974. 1 tab, 126 ref.

Descriptors: Water treatment, *Sewage treatment, Coliforms, Microorganisms, Bacteria, *Water quality, Water pollution, *Water pollution control, *Waste water treatment, Escherichia coli, Water quality standards.

The need for a reevaluation of the role of coliforms in water quality is discussed. The therapeutic value of antimicrobial drugs is diminishing due to the rapid increase of resistant bacteria. A current prominent type of resistance is

mediated by R factors (extrachromosomal nucleic acid elements) which may cause high level resistance to other antibacterial agents such as ultraviolet light, heavy metals, bacteriocins, and phages, and may enhance the virulence and infectivity of pathogens. Intestinal Gram-negative bacteria like coliforms may act as reservoirs of R factors and transfer them to pathogens. Evidence is presented that sewage-polluted water may play an important role in the spread of coliform and other bacteria-carrying R factors. Since coliforms have joined forces with bacteria increasingly involved in disease, they can no longer be regarded as harmless indicators of fecal pollution. This calls for reevaluation of water quality standards and for more advanced purification of sewage prior to discharge into the environment. (Merritt-FIRL)
W74-10497

A CHLORINE DEMAND STUDY OF SECONDARY SEWAGE EFFLUENTS,
Illinois State Water Survey, Peoria. Water Quality Section.
S. Lin, and R. L. Evans.
Water and Sewage Works, Vol 121, No 1, p 35-44, January, 1974. 1 fig, 4 tab, 10 ref.

Descriptors: *Sewage treatment, *Chlorination, Mathematical studies, Municipal wastes, Chlorine, *Waste water treatment.
Identifiers: Chlorine demand, Calcium hypochlorite.

Samples of sewage effluent from three types of secondary sewage treatment were chlorinated with calcium hypochlorite and chlorine water at dosages through 12 milligrams/liter chlorine. Chlorine demands were ascertained by periodic determinations of residual chlorine during a time span of 60 minutes. The chlorine demands were observed to be influenced by the initial dosage, contact time, and the source of chlorine. In general, the higher the dosage, the greater the demand. The demand of the sewage effluents was consistently less when using calcium hypochlorite compared to chlorine water. The demands also varied from run to run and with the types of sewage treatment. Two geometric expressions, one for contact times of 1-12 minutes, and the other for times of 12-60 minutes, were useful for predicting the chlorine demands of domestic sewage. These expressions utilize the weight ratio of the chlorine dosage and the ammonia-N concentration of the sewage effluents. (Meritt-FIRL)
W74-10498

PALM BEACH COUNTY SEWAGE IMPROVEMENT PROGRAM FLORIDA (FINAL ENVIRONMENTAL STATEMENT).
Environmental Protection Agency, Atlanta, Ga.
Available from Nat Tech Info Serv, Springfield, Va 22161, as EIS-FL-72-5809-F-1. December 20, 1972. 434 p, 13 map, 16 tab, 3 illus, 11 chart.

Descriptors: *Florida, *Environmental effects, *Waste water treatment, Government finance, Oceans, *Water pollution, Lakes, Outfall sewers, Sewage, Municipal wastes, Environmental sanitation, Sewage treatment, Costs, Ocean circulation, Coasts, Interceptor sewers, Federal Water Pollution Control Act.
Identifiers: *Environmental impact statements, *Palm Beach Co(Fla).

The proposal consists of federal assistance under the Federal Water Pollution Control Act to aid in construction of a regional wastewater treatment plant for the city of West Palm Beach, Florida. The initial project will consist of a 16 million gallon per day secondary treatment facility using the extended air modification of activated sludge. A decision on the grant is deferred pending the results of negotiations between Palm Beach and West Palm Beach. The beneficial results of the project would be to remove a source of inadequately treated wastewater from Lake Worth and provide adequate treatment for the disposal method selected. The adverse results include committing land for treatment plant site and clearing a right-of-way for a transmission line from the existing treatment plant to the new site. Other alternatives were: no action; advanced waste treatment such as nitrogen, phosphorus or activated carbon; and sludge disposal by landfill, ocean disposal or incineration. (Conko-Florida)
W74-10514

ACTIVATED SLUDGE - BIO-DISC TREATMENT OF DISTILLERY WASTEWATER,
American Distilling Co., Pekin, Ill.
J. L. Thomas, and L. G. Koehrsen.
Available from GPO Sup Doc EP1.23:660/2-74-014, $1.40; microfiche from NTIS, Springfield, Va 22161 as PB-234 383, $2.25. Environmental Protection Agency, Technology Series Report EPA-660/2-74-014, April 1974. 92 p, 10 fig, 20 tab, append. EPA Project 12060 FLL. Program Element 1BB037.

Descriptors: *Activated sludge, *Industrial wastes, *Waste identification, *Design criteria, Biological treatment, Evaluation, *Waste water treatment, Cost comparisons, Aeration, Pilot plants.
Identifiers: *Distillery wastes, *Rotating biological contactor, Aeration clarification.

Plant scale evaluation of activated sludge and Bio-Disc treatement of distillery wastewater has been conducted over a period of more than one year at Pekin, Illinois. The activated sludge process consistently provided in excess of 90 percent removal of BOD5, even at loadings greater than the treatment plant design levels. The Bio-Disc process had to be down-rated from the original design basis in order to approach a comparable removal efficiency. Of the two systems evaluated, the activated sludge process was the more desirable from standpoints of economics, treatment performance, and ability to handle shock loads. (EPA)
W74-10525

A PREDICTIVE MODEL FOR SLUDGE CHARACTERIZATION USEFUL TO DESIGN AND CONTROL OF SLUDGE DEWATERING PROCESSES IN WATER RECYCLE SYSTEMS,
Maine Univ., Orono. Dept. of Chemical Engineering.
E. G. Bobalek, R. E. Durst, and B. Yadeta.
Available from the National Technical Information Service as PB-233 205, $4.50 in paper copy, $1.45 in microfiche. Environmental Studies Center, Completion Report No 1-74, July 1973. 110 p, 22 fig, 10 tab, 37 ref. OWRR B-008-ME(1).

Descriptors: *Bound water, *Filtration, *Model studies, Slurries, Filters, Industrial wastes, Municipal wastes, *Sludge, *Dewatering, *Water reuse, Fluid mechanics, *Recycling, *Waste water treatment.

An empirical correlation was developed relating the filterability of synthetic slurries to the hydrophilic character of the resulting filter cakes and the filtration driving force. The hydrophilic character was evaluated by determining the bound water corresponding to 99% saturation of the filter cake samples as indicated by the vapor pressure at a fixed temperature, while the driving force was provided by a differential pressure system. The experimental data were correlated using dimensionless variables and the results indicated that at a fixed bound water the dependence of filterability on the driving force group was almost linear, while at a constant driving force a one cycle change in bound water resulted in a two cycle change in the filterability. It is concluded that the filterability of synthetic slurries correlates inversely with the hydrophilic character of resultant filter cakes, where such a characteristic is defined and measured as the equilibrium bound water in the filter cakes at a standardized temperature. No single mechanism of water binding is sufficient to account for the total bound water in colloid modified solid liquid systems. The relationship between bound water and filterability is a proper index of filterability independent of slurry composition. (Merritt-FIRL)
W74-10528

STATE OF MARYLAND WASTE OIL RECOVERY AND REUSE PROGRAM,
Environmental Quality Systems, Inc., Rockville, Md.
E. J. Martin, and G. D. Gumtz.
Copy Available from GPO Sup Doc as EP1.23:670/2-74-013, $2.70; microfiche from NTIS, Springfield, Va 22161 as PB-234 446, $2.25. U.S. Environmental Protection Agency, Office of R and D. Environmental Protection Agency, Technology Series Report EPA 670/2-74-013, January 1974. 248 p, 10 fig, 93 tab, 51 ref. EPA Program Element IBB041. S800650.

Descriptors: *Oil wastes, *Maryland, *Management, *Planning, *Control, Recycling, Surveys, Regions, Economics, Waste treatment, Waste disposal, Industrial wastes, Cost analysis, Design data, Oil spills.
Identifiers: *Waste oil recovery, Waste crankcase oil, Waste lube oil, Waste oil collection, Waste oil re-refining, Waste industrial oils, Implementation plan, Recovery and reuse.

This report supplements the findings of a 1971 study conducted by the Maryland Environmental Service and the Department of Health and Mental Hygiene, which concluded that the discharge of waste oils to state waters produced a problem within the State of Maryland. The report recommended a comprehensive program of collection, storage, and reprocessing for pollution prevention and for resource recovery. The program was guided by the premises that all categories of waste oils generated within the State were to be managed, recovered, or disposed of, that fuel oils would be the principal products produced, and that current state-of-the-art technology would be used in the design of the program elements. Using questionnaires and interviews, it was estimated that 18.5 million gallons of waste oils were generated in Maryland in 1972. Mathematical models determined the most effective collection systems and economics for the waste oil program. Preliminary designs were developed for different scales of process plants. Heavy emphasis was placed on protecting the environment. Plant costs varied between $3 million for a 7.3 million gallon per year (mgy) plant, to $7.5 million for a 30 mgy plant. Management, legislative and regulatory approaches to the waste oil problem were also delineated. A waste oil recovery and reuse program can be initiated immediately using existing technology, collection and storage resources. Because of a need to consider all sources of waste oils, the program requires subsidization at lower plant throughputs. At the 30 mgy capacity, the program economics can be self-sustaining. (EPA)
W74-10539

FINAL REPORT--DEEPWATER PILOT PLANT TREATABILITY STUDY.
Delaware River Basin Commission, Trenton, N.J.
Copy Available from GPO Sup Doc as EP1.23:660/2-73-038, $4.10; microfiche from NTIS, Springfield, Va 22161 as PB-234 441, $2.25. Environmental Protection Agency, Technology Series Report EPA-660/2-73-038, March 1974. 417 p, 165 fig, 60 tab, 4 ref, append. Program Element 1BB036. EPA Project 11060-DRO.

Descriptors: *Pilot plants, *Activated sludge, Regional analysis, Aerobic digestion, Filtration, Activated carbon, Organic loading, *Delaware River Basin Commission, *New Jersey, *Waste water treatment, Pre-treatment(Water), Neutralization.
Identifiers: *Joint industrial-municipal treatment, *Regional wastewater treatment, Vacuum filtration, Clarification, Filter pressing.

The Delaware River Basin Commission initiated a study of a joint industrial-municipal regional wastewater collection and treatment system for southern New Jersey. Staff personnel determined an optimum collection area for ten industrial plants and inclusive municipalities. Engineering-Science, Inc., Washington, D.C. was selected as design and operating engineers of a 50 gpm pilot plant to treat a composite of refinery, petrochemical, and municipal wastewater. Raw wastewater was subjected to the following processes: pretreatment, equalization, neutralization, primary clarification, varied types of activated sludge, final clarification, and intermittent varied testing on polishing and disinfection. The activated sludge process, at optimum conditions, removed 90 percent of the BOD of the strong predominately industrial waste. The raw wastewater color ranged from 200 to 1800 units color which was readily removed by carbon sorption of the activated sludge effluent. Aerobic digestion reduced excess activated sludge volatile suspended solids 50 percent in 20 days. Either vacuum filtration or filter pressing would be most applicable for dewatering. Pilot plant operation confirmed treatability proposals, developed design criteria and pointed out areas of additional study. (EPA)
W74-10540

ANAEROBIC - AEROBIC PONDS FOR BEET SUGAR WASTE TREATMENT,
Beet Sugar Development Foundation, Fort Collins, Colo.
W. J. Oswald, R. A. Tsugita, C. G. Golueke, and R. C. Cooper.
Copy available from GPO Sup Doc as EP1.23/2:73-025, $2.10; microfiche from NTIS, Springfield, Va 22161 as PB-227 343, $2.25. Environmental Protection Agency, Technology Series Report EPA-R2-73-025, February 1973. 153 p, 42 fig, 11 tab, 13 ref, 8 append. EPA Grant No. WPD-93-03;93-04.

Descriptors: *Waste water treatment, Water quality control, Pollution abatement, Industrial wastes, Pilot plants, Treatment facilities, Sugar beets, *Biochemical oxygen demand, Oxidation lagoons, Aerated lagoons, Aerobic conditions, Anaerobic conditions.
Identifiers: *Sugarbeet waste treatment, *Anaerobic ponds, *Facultative ponds, *Aerobic ponds, Algal growth, Nutrient addition, Odor control.

Sugarbeet factory transport (flume) water wastes were treated in pilot-sized anaerobic, facultative and aerobic ponds to remove BOD. Physical, chemical and mechanical data were collected on the performance of each pond which showed cause for abandoning the facultative phase of treating. BOD removal in the anaerobic pond was a linear function of the BOD loading and up to a loading of 2,000 pounds of BOD per acre per day, 80% removal was accomplished with the assistance of mechanical aeration. The algae (aerobic) pond was mixed by means of four 12,000 gpm propeller pumps. Some unseparated algae pond effluent was recycled to the anaerobic pond proving organic nitrogen, phosphorus and 'seed' for the microbial transformations. Additional nutrients were required for maximum performance. The system was effective in converting soluble BOD to insoluble BOD. The report indicates potential commercial application of certain segments of the process investigated. (EPA)
W74-10542

TREATMENT AND RECOVERY OF FLUORIDE INDUSTRIAL WASTES,
Grumman Aerospace Corp., Bethpage, N.Y.
C. J. Staebler, Jr.
Copy Available from GPO Sup Doc as EP1.23:660/2-73-024, $1.40; microfiche from NTIS, Springfield, Va 22161 as PB-234 447, $2.25. Environmental Protection Agency, Technology Series Report EPA-660/2-73-024, March 1974. 85 p, 23 fig, 20 tab, 16 ref, append. EPA Project S800680(12070 HGH). Program Element IBB036.

Descriptors: Lime, *Ion exchange, Calcium, Sludge, *Fluorides, *Waste water treatment, *Industrial wastes, Separation techniques, Pilot plants, Water reuse, Centrifugation, Chemical precipitation.
Identifiers: *Fluoride industrial wastes, *Lime treatment, Recovery(Wastes).

The development and successful demonstration of laboratory and pilot-scale fluoride treatment techniques for selected aerospace and metal working industry chemical processing solutions and rinse waters are described. Included are laboratory-scale, lime treatment parameters for chemical processing solutions such as temperature, retention time, pH, slurry concentration and fluoride influent and effluent levels, and ion-exchange treatment to reduce the fluoride concentration of rinse waters to levels less than three parts per million. Pilot studies of centrifugal techniques to separate lime-precipitated bridges from titanium chemical milling, titanium descaling and aluminum deoxidizing solutions show that lime precipitation can give final effluents having fluoride concentrations less than three parts per million. Aluminum conversion coating solutions, however, require secondary treatment with aluminum sulfate to give final effluents have fluoride concentrations less than three parts per million. Chemical and mechanical property tests show that is is potentially feasible to use calcium fluoride sludge as a strength-maintaining additive for concrete. The reuse of treated rinse waters, the economics of precipitation, and production plans for chemical processing solutions and rinse waters are also presented. (EPA)
W74-10543

IMPROVEMENT OF TREATMENT OF FOOD INDUSTRY WASTE,
RAI Research Corp., Long Island City, N.Y.
S. B. Tuwiner.
Copy Available from GPO Sup Doc as EP1.23:660/2-74-035, $1.25; microfiche from NTIS, Springfield, Va 22161 as PB-234 444, $2.25. Environmental Protection Agency, Technology Series Report EPA-660/2-74-035, May 1974. 73 p, 31 fig, 4 tab, 30 ref. EPA Project 12060 ESY, Program Element IBB037.

Descriptors: *Dairy industry, *By-products, Electrolysis, *Oxidation, Froth flotation, Activated carbon, Adsorption, *Waste water treatment, Chemical oxygen demand.
Identifiers: *Cheese whey, *Protein recovery, *Electrolytic oxidation, Agitation, *Chemical oxygen demand reduction.

Laboratory studies were conducted to determine the feasibility of reducing the COD demand of cheese whey waste generated from dairy processing plants. Three primary processing variables were studied; agitation, temperature and current density. Results indicate electrolytic oxidation efficiency was best at 70C, agitation at 9.6 feet per second and a current density of 9.5 amperes per square foot (equivalent to 6 amperes in the test cell investigated). Concentration of 60 percent of the whey protein was also possible by collection of the froth produced during electrolysis. This mechanism of COD reduction could afford recoverable protein from the whey. Carbon adsorption of the electrolyzed whey was also shown to be extremely effective in reducing the COD. The carbohydrates after oxidation to carboxylic acids are very readily adsorbed, the carbon loading being in excess of that expected for secondary effluents. The feasibility of combining the electrolytic oxidation with froth collection and carbon adsorption is proposed as a possible attractive procedure for recovery of values from the whey. (Boydston-EPA)
W74-10544

WASTEWATER ABATEMENT IN CANNING VEGETABLES BY IQB BLANCHING,
Wisconsin Univ., Madison. Dept. of Food Science.
D. B. Lund.
Copy Available from GPO Sup Doc as EP1.23:660/2-74-006, $1.25; microfiche from NTIS, Springfield, Va 22161 as PB-234 495, $2.25. Environmental Protection Agency, Technology Series Report EPA-660/2-74-006, April 1974. 78 p, 29 tab, 12 ref, append. EPA Program Element IBB037. Grant No. S-801484.

Descriptors: *Pollution abatement, Water pollution, Canneries, Vegetable crops, *Industrial wastes, Pre-treatment(Water), *Waste water treatment.
Identifiers: *Blanching(Vegetables), *Cannery wastes, *Vegetable processing wastes, Individual quick blanching.

A study on the efficacy of a new blanching system, Individual Quick Blanch (IQB), as applied to vegetables prior to canning was conducted. Peas, corn, lima beans, green beans, potatoes, carrots and beets were adequately blanched by IQB. Compared to deep bed steam blanching or pipe blanching, IQB generally resulted in a significant reduction in effluent. Slight drying of the vegetables before IQB reduced effluent even more; however, product quality was adversely affected in most cases. It was demonstrated that the IQB process can significantly reduce effluent volume and BOD generation in the blanching operation while adequately fulfilling the objectives of blanching. Recommendations for commercial development of IQB are given. (EPA)
W74-10545

TERTIARY PHOSPHORUS REMOVAL AND LIMITING NUTRIENT STUDIES AT C.F.S. LAC ST. DENIS,
Environmental Protection Service, Burlington (Ontario). Wastewater Technology Centre.
E. E. Shannon, and J. M. Salvo.
Environment Canada Water Pollution Control Directorate Report No. EPS 4-WP-74-1, February 1974. 60 p, 16 fig, 16 tab, 24 ref.

Descriptors: *Waste water treatment, *Pilot plants, *Oxidation lagoons, Chemical treatment, Coagulation, Flocculation, Filtration, Algae, Nutrients, Growth rates, Effluents, Filters, *Phosphorus, Zinc, Lead, Iron, Nitrogen, Coliforms, Eutrophication, Operating costs, *Canada, *Tertiary treatment.
Identifiers: Alum, Backwash, *C.F.S. Lac St. Denis(Canada).

Pilot plant experiments on the treatment of the stabilization pond effluent from Canadian Forestry Services Lac St. Denis are described. The plant was a 10 Igpm chemical treatment system consisting of chemical coagulation, flocculation, tube settling, and mixed media filtration components. Various alum and polymer feed conditions were evaluated over the 10 mo period of continuous operation. Algal assays were carried out on the receiving water, Lac Depatie, to determine the limiting nutrient and to ascertain the effect of treated and untreated pond effluent upon algal growth. Because of seasonal variations in the quality of the stabilization pond effluent, it was observed that the recommended summer alum dosage level of 100 mg/l must be increased to 150 mg/l to achieve equivalent phosphorus removal. Filter backwash requirements and backwash sludge production and characteristics were determined. For several chemical feed conditions the pilot plant demonstrated a limited capability for zinc, lead, iron, and nitrogen removal and a high efficiency for coliform removal. Phosphorus was the probable limiting nutrient in Lac Depatie and the planned efforts to reduce phosphorus loading to the lake from C.F.S. Lac St. Denis should significantly reduce the present eutrophic conditions. Chemical operating costs are estimated at 5.3 cents/1000 l gal. (Merritt-FIRL)

W74-10551

BIOLOGICAL TREATMENT OF AIRPORT WASTEWATER CONTAINING AIRCRAFT DE-ICING FLUIDS,
Environmental Protection Service, Burlington (Ontario). Wastewater Technology Centre.
B. E. Jank, H. M. Guo, and V. W. Cairns.
Environment Canada Water Pollution Control Directorate Report No EPS-4-WP-73-5, July 1973. 113 p, 26 fig, 43 tab, 7 ref, 2 append.

Descriptors: *Biological treatment, *Waste water treatment, *Deicers, *Activated sludge, Pilot plants, Air temperature, *Canada, Design criteria, Bioassay, Rainbow trout, Toxicity, Domestic wastes, Biochemical oxygen demand, Suspended solids, Microorganisms, Organic wastes, Effluents, Aeration, Equipment, Nutrients, Oxidation.

The feasibility of treating a combination of de-icing fluids and airport waste water using an activated sludge process was investigated to provide information for the design of treatment facilities at the new airport at St. Scholastique, Quebec, and for assessing alternatives at other airports across Canada. The first part of the study was a bench scale activated sludge study to determine the optimum loading condition and to obtain design parameters for the treatment of de-icing fluids and municipal sewage at low temperatures. A 131 cu m/day Igpm pilot plant was operated at the optimum organic loading to verify the results from the laboratory scale study and determine whether there were any operational problems. The second part of the program, bioassay studies, was carried out to determine whether the aircraft de-icing fluids and process effluents were acutely toxic to rainbow trout. The results show that an activated sludge system treating a combination of de-icing fluid and domestic sewage at less than 10C produces an effluent have BOD and suspended solids concentrations not exceeding 20 mg/liter and 25 mg/liter respectively at a loading of 0.15 kg BOD/kg MLSS/day. Growth of filamentous microorganisms and the resulting bulking condition were responsible for the low loading condition. (Merritt-FIRL)
W74-10552

PROCESS DESIGN AND OPERATION FOR ZERO EFFLUENT DISCHARGE,
Environmental Science and Engineering, Inc., Gainesville, Fla.
E. R. Hendrickson, and H. S. Oglesby.
Tappi (Technical Association of the Pulp and Paper Industry), Vol 57, No 4, p 71-73, April 1974. 8 ref.

Descriptors: *Federal Water Pollution Control Act, *Water pollution, *Effluents, Water reuse, Water treatment, Industrial wastes, Legislation, Washing, Bleaching wastes, Screening, Dilution, Chemicals, *Waste water treatment.
Identifiers: *Zero effluent discharge, Water reclamation, Amendments to Federal Water Pollution Control Act, 1972, Pulp washing efficiency.

The Federal Water Pollution Control Act Amendments of 1972 declared the national goal to be that the discharge of pollutants into navigable waters be eliminated by 1985. This is commonly referred to as 'zero effluent discharge.' A kraft mill, for example, will require a combination of reduction of waste water generation, maximizing reuse of waste water streams, and development and application of unique new treatment techniques. Among the process measures which look promising to reduce waste water discharges are: increasing pulp washing efficiency, closing brown stock screening, oxygen or other bleaching, increasing dilution in washing, stripping condensates, collecting chemical spills, collecting fiber spills, and dry barking. It may be possible to maximize reuse of waste water streams and recover the chemicals. Most of these techniques are in the early development stages and some consist only of isolated unit processes. (Prague-FIRL)
W74-10554

(CITY OF SUDBURY, ONTARIO, CANADA).
Water and Pollution Control, Vol 112, No 3, p 32, March 1974.

Descriptors: *Sludge disposal, Treatment facilities, Sewage, *Sludge treatment, Sludge, Investigations, Organic wastes, Oxidation, Limestones, *Canada, *Waste water treatment.
Identifiers: *Sudbury(Ontario-Canada).

The City of Sudbury, the Ontario Environment Ministry, and the International Nickle Co. of Canada, Ltd. are currently experimenting together for a means of disposing of digested sewage sludge from the city's new water pollution control plant. The plant's waste is being dumped onto INCO's tailings disposal area. About 150,000 gallons of sludge have been dumped each week on test plots. This is equivalent to 1800 cu yd of sludge spread monthly by trucks working 5 days a wk. The test plots include both vegetated and nonvegetated areas to enable collecting data on a controlled basis. The plot sizes vary, but together encompass approximately 50 acres. The experiment will evaluate different types of vegetation which may or may not produce second generation growth mutations. The organic waste oxidizes slowly and releases nutrients in addition to acting as a pH control. Limestone is the principal additive reaching the tailings area. Natural composition is mainly silica, iron and those minerals found in granite rock. The average depth of sludge penetration into the tailings has yet to be assessed. There is still uncertainty as to the benefits which the sludge will contribute. (Merritt-FIRL)
W74-10555

SUBMERGED AERATORS ARE HOT,
Philadelphia Mixers Corp., King of Prussia, Pa.
R. L. Winter.
Water and Wastes Engineering, Vol 11, No 3, p 37-38, 69, March 1974.

Descriptors: *Waste water treatment, *Aeration, *Waste water disposal, Underground structures, Costs, Flexibility, Mixing, Oxygenation, Basins.
Identifiers: *Aerators(Submerged).

The advantages and applications of submerged turbine aerators are described. The systems are particularly economical to use where land costs are relatively high because they can provide higher intensities than surface aerators. The aerators offer flexibility for changing the performance characteristics of the installation. A submerged unit can be easily modified to generate and distribute a larger volume of air than originally designed for. The basins take up considerably less space than surface aerators and they are highly effective in dispersing oxygen through the aeration basin. Their oxygen utilization is at least 20% which is four times as high as the diffused air types. The submerged systems are highly efficient due to the combination of pressured diffusion with that of mechanical mixing, the saturation level of the liquid being mixed, and the compact design of the basins. (Merritt-FIRL)
W74-10557

FORGING THE MISSING LINK,
For primary bibliographic entry see Field 5C.
W74-10558

AN EXPERIMENT ON DISPOSAL OF METAL WORKING OIL EMULSION INTO SEWER SYSTEMS (KINZOKU KAKOYU NO HAISUI SHORI NI KANSURU ICHI JIKKEN),
Kao Soap Co., Tokyo (Japan). Industrial Research Labs.
K. Izumi, and H. Nagamori.
Junkatsu (Journal of the Japanese Society of Lubrication Engineers), Vol 19, No 3, p 32-40, March 1974. 6 fig, 4 tab, 12 ref.

Descriptors: *Waste disposal, *Oil, *Emulsions, Sewerage, *Industrial wastes, Equipment, Electrodes, Anodes, *Oxidation, Corrosion control, Flow rates, Organic matter, *Waste water treatment.
Identifiers: Japan, Platinum, Ruthenium.

An anode oxidation procedure for the disposal of metal working oil emulsion into sewer systems was developed to decompose emulsifiers followed by short time settling to separate the oil from the water. The procedure can be used in laboratories or in machine shops of small size where small quantities of emulsions need to be disposed of and where independent sewer systems of large capacity cannot be justified. A platinum (and/or ruthenium) plated sintered glass filter was used to make the equipment compact and to reduce man power to replace the anode due to corrosion. There was a 95% removal of organic matter from the drainage water although the flow rate of the emulsion was too low to be practical. Changing the shape and the structure of the electrodes will probably increase the flow rate. (Merritt-FIRL)
W74-10559

STUDY OF CARBOHYDRATE SOLUBILIZATION FROM SEWAGE SLUDGES,
Holywell R. D. C. (Wales).
S. G. H. Owen, and R. Lamb.
Water Pollution Control, Vol 78, No 1, p 114-120, 1974. 8 fig, 17 ref.

Descriptors: *Carbohydrates, *Sewage sludge, *Solubility, *Sludge treatment, Mixing, Hydrogen ion concentration, Age, Liquid wastes, *Solids contact processes, *Waste treatment, Dilution, Organic compounds.

Carbohydrate solubilization from sewage sludges was investigated to examine: the degree of solubilization of carbohydrates occurring from the sludge to the sewage liquid; the changes in carbohydrate concentration in the liquid isolated from the sludge; and some of the factors which may influence these processes. Although dilution was important, there was a tendency for the same concentration of carbohydrates to dissolve into the liquid no matter what the dilution. The time of contact between the liquid and the sludge was important, with more carbohydrates solubilizing out into the liquid the longer the time of contact, at least up to the 18th day, if the sludge and liquid were not mixed. Mixing of the sludge and liquid was important, although after an initial large increase in concentration within the first day, the rate and pattern of solubilization in a mixed sample was similar to that in the unmixed sample. The age of the sludge affected the quantity of carbohydrates dissolving into the liquid; the fresher the sludge, the greater the amount of solubilization. Temperature had little effect on the process, although a low temperature of 2C tended to slow down the process. The initial pH of the system was not important. There was a 50% reduction in carbohydrate concentration if the sludge liquid was kept out of contact with the sludge for one day. (Merritt-FIRL)
W74-10562

ASH-HANDLING SYSTEM ELIMINATES RUNOFF POLLUTION.
For primary bibliographic entry see Field 5G.
W74-10564

WATER TREATMENT CHEMICALS.
Indian Chemical Journal, Vol 8, No 6, p 40, December 1973.

Descriptors: *Water treatment, *Chemicals, Organic acids, Polymers, Boilers, Recirculated water, Corrosion control, Water cooling, Sludge.

Identifiers: United Kingdom, India, Carboxylic acid.

A new range of water treatment chemicals, called the Belgard 800 range has been introduced by the Industrial Chemicals division of Ciba-Geigy (UK) Ltd. All, except Belgard 880 and 881, are based on a low molecular weight polymeric carboxylic acid. There are seven chemicals in the range, two for boiler treatment applications and five for use in water recirculation systems. Of the latter five, types 880 and 861 are for use as scale control additives and act as threshold and crystal distortion agents, giving a physical as well as chemical action; types 881 and 883 are corrosion inhibitors without the inherent disadvantages of chromates or polyphosphates; and type 880 is a pretreatment formulation designed to passivate the water wetting surface of cooling systems, and give rapid conditioning of the system prior to its treatment with Belgard 881. The two chemicals for steam raising boilers, types 850 and 851, were developed to deal with problems arising from the deposition of hardness scale and sludge in the feed system and the boiler. All seven grades meet the modern day requirements of industry, such as ease of application, reliability and economy, and extend the inservice operation of the plant and reduce downtime for cleaning. (Merritt-FIRL)
W74-10565

THE DESIGN AND OPERATION OF ACTIVATED SLUDGE FINAL SETTLING TANKS,
Satec Ltd., Crewe (England).
R. L. Hibberd, and W. F. Jones.
Water Pollution Control, Vol 78, No 1, p 14-32, 1974. 13 fig, 9 tab, 11 ref.

Descriptors: *Activated sludge, *Settling basins, Evaluation, *Design, Operation, Analysis, Effluents, Anaerobic conditions, Laboratory tests, Flow, *Suspended solids, *Sludge treatment, *Waste water treatment.

The design and operation of activated sludge final settling tanks were investigated in laboratory studies. Three aspects of the tank operation are important: the production of a clarified effluent under all flow and sludge conditions; the return of a concentrated underflow to maintain mixed liquor suspended solids (MLSS) concentrations, and the prevention of excessive solids retention periods under anaerobic conditions. The theoretical analysis of sludge thickening overestimates the solids handling capacity of the final tank. The error in the prediction can be related to sludge bed depth and return sludge rate by conducting laboratory continuous tests. The extent to which the laboratory results can be applied to full scale tank performance depends upon the degree of flocculation obtain in the tank and the uniformity of flow distribution over the plan area. A tank design approach to maintain clarification at all flow conditions is suggested. This is based on providing sufficient capacity for dry weather flow loading with shallow bed depths in the tanks, and ensuring that an excessive increase in bed depth does not occur during high flows. The criteria derived will vary with the aeration unit size and the MLSS concentration required, and assumes that a low bed depth will be maintained under low flow conditions. (Merritt-FIRL)
W74-10573

SEWERAGE SYSTEMS DESIGN.
Computer Aided Design, Vol 6, No 1, p 54-55, January, 1974.

Descriptors: *Computers, *Sewerage, Data storage and retrieval, Data processing, Documentation, Optimization, *Hydraulic design, Pipes, *Automation, Estimating, Data collections, *Design criteria, *Control systems.

An integrated computer-based system for the design of sewerage systems and for the automatic production by computer of drawings and contract documents has been developed by General and Engineering Computer Services, Ltd., Liverpool, England. The programs are totally interlinked which reduces to a minimum the manual production of information, yet permits the engineer to intervene at all stages of the design process to overwrite and to amend the computerized design. There are seven individual program modules: master file creation and control programs; optimization; hydraulic calculations; pipe strength and class of bedding; automatic drawings; estimates and K29 form; and bill of quantities. (Merritt-FIRL)
W74-10575

SEWAGE DISPOSAL SYSTEM,
Aerobiotic Sciences Inc., Jersey City, N.J.
W. C. Langston, and D. W. Smith.
U S Patent No 3,807,565, 4 p, 4 fig, 7 ref; Official Gazette of the United States Patent Office, Vol 921, No 5, p 1910, April 30, 1974.

Descriptors: *Patents, *Sewage treatment, *Aerobic treatment, *Filtration, *Wastewater treatment, Pollution abatement, Water quality control, Water pollution control, Aeration, *Sewage disposal.
Identifiers: Aerators, Activated charcoal.

An Aerobiotic sewage disposal system includes a primary comminution or break up chamber in which gross incoming solids are broken up and partially oxidized as they pass within a fiberglass cone. The bottom of this conical hopper has a circular aerator positioned so as to provide only a thin annular passage so that only minute solid particles may escape the cone compartment after being reduced in size through aerobic action. The secondary treatment is strained through a filter placed around the conical hopper so that, by aerobic action, the biological filtering can be completed. This filter bag is formed of a 'sandwich' of polyester deep pile inner lining with a center of activated charcoal and an outer polyester cloth. The second aerator is placed around the bottom surface of the unit, with the bottom wall of the unit being convex so that minute suspended solids which may pass through the filter bag, would tend to settle around the bottom edge of the unit, and would be agitated by the aerator which is in the lowermost corners of the unit and prevents any accumulation of sludge. A third filter is provided for completing filtration with a weir pick up being provided for collecting the effluent. (Sinha-OEIS)
W74-10577

WEAKLY OXIDIZING ORGANIC SUBSTANCES IN WASTE WATERS AND THE PROBLEM OF SANITARY PROTECTION OF WATER BODIES, (IN RUSSIAN),
Meditsinskii Institut, Irkutsk (USSR). Dept. of General Hygiene.
Ya. M. Grushko.
Gig Sanit. Vol 37, No 7, p 80-83. 1972.
Identifiers: *Aeration, *Incineration, *Organic matter, *Ozonization, Sanitary protection, *Waste water treatment.

Techniques adopted for the treatment of waste waters with poorly oxidizable organic matter in various countries are reviewed. Possible methods include aeration, ozonization and incineration.--Copyright 1973, Biological Abstracts, Inc.
W74-10582

FLOATING SOLIDS RETURN DEVICE,
Oldham (Robert R.) Inc., Sidney, Ohio.
R. R. Oldham, and J. H. Wooddell.
U S Patent No 3,805,957, 4 p, 2 fig, 2 ref; Official Gazette of the United States Patent Office, Vol 921, No 4, p 1483, April 23, 1974.

Descriptors: *Patents, *Sewage treatment, *Waste water treatment, Pollution abatement, *Liquid wastes, Water quality control, Water pollution control, Equipment, Separation techniques, Aerators, Effluent, Settling basins.
Identifiers: *Settling tanks.

A sewage treatment system in which liquid sewage containing solids is conducted into first or primary settling tank is disclosed. Liquid is drawn from an intermediate depth of the first tank and conducted to a reducing tank containing means for inducing air (aerator) into the fluid. A final or outflow settling tank adjacent the reducing tank includes a wall in common with the reducing tank under which settled solids are conducted from the outflow tank to the reducing tank. A floating solids return is also provided between the outflow and reducing tanks, and includes a provision for closing off the fluid flow path from the reducing tank to the output tank when the aerator is not operating to prevent the surface fluid of the reducing tank from flowing into the outflow settling tank. The effluent is drawn from an intermediate depth of the outflow settling tank. (Sinha-OEIS)
W74-10583

PROCESS FOR TREATING WASTE WATER FROM INDUSTRIAL PROCESSES,
Deutsche Texaco A.G., Hamburg (Germany). (assignee)
E. Ruschenburg.
U S Patent No 3,804,757, 3 p, 1 fig, 4 ref; Official Gazette of the United States Patent Office, Vol 921, No 3, p 1149, April 16, 1974.

Descriptors: *Patents, *Industrial wastes, *Waste water treatment, Water pollution control, Water quality control, Pollution abatement, Hydrogen sulfide, Ammonia, Phenols, *Chemical wastes, *Separation techniques.
Identifiers: Ammonium sulfate, *Chemical treatment.

A process for separating hydrogen sulfide, ammonia and phenolic compounds from waste water comprises: (a) stripping the hydrogen sulfide and ammonia from the waste water, (b) treating the stripped hydrogen sulfide and ammonia with sulfuric acid to form ammonium sulfate and release hydrogen sulfide, (c) removing the freed hydrogen sulfide, and (d) mixing a portion of the ammonium sulfate solution from (b) with an aqueous caustic solution of phenolic compounds in a vessel causing the phase separation of the phenolic compounds which may then be removed. (Sinha-OEIS)
W74-10584

SEWAGE TREATMENT SYSTEM,
L. H. Cervantes.
U S Patent No 3,804,755, 3 p, 1 fig, 6 ref; Official Gazette of the United States Patent Office, Vol 921, No 3, p 1149, April 16, 1974.

Descriptors: *Patents, *Waste treatment, *Waste water treatment, *Sewage treatment, Water pollution control, Water quality control, Pollution abatement, Chlorination, Oxygenation, Filtration, Temperature, Pressure.

After screening and comminuting raw sewage it is subjected to chlorination. The chlorinated sewage is enriched with oxygen in excess of the capacity of the sewage to dissolve oxygen. Temperatures are increased to 100 deg to 110 deg C and pressures increased up to about 17 atmospheres to obtain organic and inorganic precipitates. The treated sewage is filtered and filtrate and purified effluent separately removed. (Sinha-OEIS)
W74-10585

COMPOSITE SEWAGE TANK,
Hession (Crowley), Wakefield, Mass.
F. X. Crowley.

U S Patent No 3,804,260, 3 p, 4 fig, 7 ref; Official Gazette of the United States Patent Office, Vol 921, No 3, p 1029, April 16, 1974.

Descriptors: *Patents, *Sewage treatment, *Waste water treatment, Water pollution control, Water quality control, Equipment, Effluents, Pollution abatement.
Identifiers: *Sewage tank.

The tank may be constructed of panels precast and initially assembled in circular or other closed formation with upright longitudinal channels or slots located between adjacent panels or spaced with respect to certain of them. These channels are subsequently filled and closed from top to bottom of the tank with cement or mortar and at an intermediate level certain panels contain inwardly projecting cantilever spoke sections or knees. These corbel units act collectively as fully efficient brackets upon which may be supported a circular settling chamber or trough. The inner wall of this trough forms a circular weir over which the liquid effluent flows into the trough. The corbel units may be cast at any selected level within the tank with the assistance of temporary forms. The bottom and side wall or walls of the effluent trough may be cast upon the firm foundation of the corbels. The effluent trough may be formed in part by the core wall of the tank itself or it may be located at a distance from the inner tank wall so that weir overflow takes place at both circumferential walls of the trough. (Sinha-OEIS)
W74-10586

STABILIZED FLOATING AERATION SYSTEM,
Clow Corp., Oak Brook, Ill.
G. Ross.
U.S. Patent No 3,802,673, 5 p, 3 fig, 3 ref; Official Gazette of the United States Patent Office, Vol 921, No 2, p 619, April 9, 1974.

Descriptors: *Patents, *Water purification, *Waste water treatment, Water quality control, Pollution abatement, *Aeration, Equipment.
Identifiers: *Aerators.

The stabilized floating aeration system is intended for use in a water purification plant. The open platform is connected to the aerator by mooring and guy lines. The floating platform provides a rigid polygonal frame that has excess buoyancy and is anchored to the bottom of the body of water by lines suspended from the corners of the polygon. The aerator comprises an impeller connected by drive means to a motor. The impeller is located at least partially below the water line and includes blades mounted for horizontal rotation about a vertical shaft or axis. The motor is located above the water line and is usually an electric motor which is connected to a shore power source by a water proof electric cord. The floating platform provides the buoyancy to support the aerator impeller in the desired vertical relationship to the water line. (Sinha-OEIS)
W74-10593

CONTROL OF ANAEROBIC DIGESTION PROCESS,
Combustion Engineering, Inc., Windsor, Conn.
A. S. Collins, and B. E. Gilliland.
Journal of the Environmental Engineering Division, American Society of Civil Engineers, Vol 100, No EE2, Paper 10475, p 487-506, April, 1974.

Descriptors: *Model studies, *Waste water treatment, *Anaerobic digestion, Flow rates, Biochemical oxygen demand, Activated sludge, Organic matter, Hydrogen ion concentration.
Identifiers: Overloads, Hydraulic overloads, Organic overloads, Digestor model, Dynamic models.

Waste water treatment plants are currently based mainly on steady-state relationships rather than dynamic models. However, variations occur in biological processes due to flow rates, organic matter concentrations, and BOD removal efficiency fluctuations. A dynamic model for the anaerobic digestion process was shown to be meaningful by Clemson University. This process considers pH response due to organic and hydraulic overloads. The results are based on the Andrews-Graef digester model, as simulated using Fortran IV. It was found that when predictive flow control is used with feedforward base addition as continuous compensation, base addition and flow rate are excessive. Reduction of the gain of the feedforward controller results in most desirable performance. (Prague-FIRL)
W74-10609

SEWER LINE DESIGN BASED ON CRITICAL SHEAR STRESS,
West Pakistan Univ. of Engineering and Technology, Lahore. Dept. of Sanitary Engineering.
For primary bibliographic entry see Field 8B.
W74-10611

LASER LIGHT USED TO LAY PIPE,
For primary bibliographic entry see Field 8A.
W74-10612

LARGE DIAMETER POLYETHYLENE FORGE MAINS INSTALLED QUICKLY,
For primary bibliographic entry see Field 8A.
W74-10613

THE DEVELOPMENT OF A NEW WATER TREATMENT,
M. Finan, and A. Atkinson.
The Stream and Heating Engineer, Vol 43, No 507, p 6-10, February, 1974. 4 fig, 3 tab.

Descriptors: *Waste water treatment, Salts, Crystals, Laboratory tests, Methodology, Heat transfer, Magnesium hydroxide, Flow, Calcium carbonate, Recirculated water, Coolingwater, Boilers.
Identifiers: *Belgard water treatment formulations, *United Kingdom.

The techniques used by CIBA-GEIGY (UK) Ltd. to develop, from laboratory to full scale use, the new Belgard range of water treatment formulations are described. The laboratory tests included: magnesium hydroxide deposition on heat transfer surfaces: static conditions; magnesikum hydroxide deposition on heat transfer surfaces: flowing conditions; and activities in simulated water recirculating. The additional following laboratory tests are described: threshold effects on various scale forming salts; crystal modification effects; calcium carbonate deposition on heat transfer sufraces: flowing conditions; and activities in steam raising boilers. (Merritt-FIRL)
W74-10614

ULTRAFILTRATION CONCEPT FOR SEPARATING OIL FROM WATER,
Abcor, Inc., Cambridge, Mass.
R. L. Goldsmith, and S. Hossain.
Available from NTIS, Springfield, Va. 22161 as AD-758 318, Price $5.45 printed copy; $2.25 microfiche. Final Contract Report to U S Coast Guard, January 1973. 126 p, 40 fig, 18 tab, 14 ref, 2 append. DOT-CG-24, 286-A.

Descriptors: *Water pollution control, *Water pollution treatment, *Oily water, Oil spills, Oil pollution, Emulsions, Oil wastes, Waste water treatment, *Filtration, *Separation techniques.
Identifiers: *Ultrafiltration.

Ultrafiltration with 1-inch diameter tubular membranes produced highly-purified water from oil emulsions. For kerosene, No. 6 Fuel oil, Venezuelan crude and lubricating oil at input ratios of 100 ppm to 90%, treated water was uniformly free of visible oil and had less than 10 ppm oil. Ultrafiltration rate depended on oil type, input ratio and operating conditions. Typically, rates were high (50-150 gal per day per sq ft) but decreased with time due to membrane fouling. Factors which increased emulsion stability or decreased concentration polarization minimized fouling. Membrane cleanup was simple and effective, with no loss in long-term membrane capacity in over 3000 continuous test hours, with cleanup each 72 hrs. Cost and physical requirements for systems of 10, 100, 1000, and 10,000 gpm were estimated for membranes in tubular and spiral wound configurations. (Knapp-USGS)
W74-10620

SEA WATER SYSTEM FOR AQUACULTURE OF ESTUARINE ORGANISMS AT THE SKIDAWAY INSTITUTE OF OCEANOGRAPHY,
Skidaway Inst. of Oceanography, Savannah, Ga.
D. B. White, R. R. Stickney, D. Miller, and L. H. Knight.
Available from NTIS, Springfield, Va 22161 as COM 73-10722 Price $3.00 printed copy; $2.25 microfiche. University of Georgia, Athens, Marine Science Center Technical Report Series No 73-1, January 1973. 18 p, 4 fig, 5 ref, 1 append.

Descriptors: *Filtration, *Waste water treatment, *Sea water, *Aquiculture, *Georgia, Estuaries, Organic matter, Clays, Microorganisms, Filters.

A filter system was developed capable of delivering over 100 gpm of clean sea water from an estuary for tests of aquiculture systems. As a result of the tremendous amount of plant biomass produced each year in the marshes at the water source in the estuary, large amounts of decaying organic matter are found in the untreated water. The organic material as well as the clay particles which enter the estuaries from land runoff serve as templates for bacterial colonization in addition to creating extremely high turbidities. Control of the quality of the water is a necessary precursor to any laboratory culturing of marine animals. (Knapp-USGS)
W74-10670

DETERMINATION OF INVESTMENT COST FUNCTIONS OF WATER TREATMENT PLANTS,
Illinois Univ., Urbana. Dept. of Business Administration.
For primary bibliographic entry see Field 5F.
W74-10691

EVALUATION OF PROTOTYPE CRUSHED LIMESTONE BARRIERS FOR THE NEUTRALIZATION OF ACIDIC STREAMS,
Pennsylvania State Univ., University Park. Dept. of Civil Engineering.
For primary bibliographic entry see Field 5G.
W74-10693

NEUTRALIZATION OF ACIDIC WASTES BY CRUSHED LIMESTONE,
Pennsylvania State Univ., University Park. Dept. of Civil Engineering.
For primary bibliographic entry see Field 5G.
W74-10694

THAT WASTE DISPOSAL PROBLEM,
Minnesota Univ., Minneapolis. Agriculture Extension Service.
R. E. Machmeier.
The Minnesota Volunteer, p 18-25, January-February, 1973. 3 illus.

Descriptors: *Minnesota, *Sewage disposal, *Septic tanks, *Lakes, *Percolation, Waste disposal, Pollution, Eutrophication, Public health, Sanitary engineering, Waste treatment, Sewage

treatment, Water pollution, Effluents, Waste water pollution), Soil density, Public benefits, Lakes, Streams, Natural resources, Waste water treatment, Water pollution treatment.
Identifiers: *Administrative regulations.

Methods of sewage disposal are recommended for the Minnesota shoreland property owner if health, home and quality of lake environment are to be protected. All sewage disposal systems are required to comply with the specifications of the 'Shoreland Standards' by July 1, 1977. Proper sewage disposal protects the public health from the disease vectors in the effluent and protects natural waters from eutrophication. A home sewage disposal system should consist of a septic tank and soil absorption system. The function, standard construction and building specifications for septic tanks are described in detail. Of the three types of soil absorption systems--the trench, the seepage pit, and the seepage bed--the trench system is recommended for its effectiveness and longevity. A soil percolation rate slower than sixty minutes per inch indicates soil unsuitable for a soil absorption system. (Dillingham-Florida)
W74-10726

TAILWATER,
For primary bibliographic entry see Field 3C.
W74-10760

REGIONALIZATION IN THE DELAWARE RIVER ESTUARY,
Delaware River Basin Commission, Trenton, N.J. Water Quality Branch.
R. Porges.
In: American Ordnance Association Proceedings of 3rd Meeting on Environmental Pollution, May 17-18, 1972. Fort McNair, Washington, D.C., p 129-143, 1973. 5 fig, 1 tab, 5 ref. FWQA 11060 DRO.

Descriptors: *Waste treatment, *Sewage districts, *Delaware River Basin Commission, *Urbanization, River basins, Economics, Political aspects, New Jersey, Pennsylvania, Delaware, Benefits, Industries, Activated sludge, Pilot plants, Facilities, Financing, Feasibility studies, Regulation.
Identifiers: *Delaware Estuary, *Regionalization, Waste treatment centralization, Deepwater project.

The regional wastewater treatment system is a logical extension of community services and the current answer to the growing megalopolis of the Delaware Estuary. Regionalization must protect water quality, be economically sound, and politically feasible. The Delaware River Estuary begins at Trenton, New Jersey and borders Pennsylvania, New Jersey, and Delaware. The principal pollution problem of the basin exists down river through the Philadelphia-Camden metropolitan area to below Wilmington, Delaware. Nearly 100 discharges encompassing communities and a wide variety of industries are involved in this reach of the river. The complexity of the wastes and the high degree of treatment required to meet state and the Delaware River Basin Commission's objectives dictated some type of biological treatment, probably activated sludge. The pilot plant for waste treatment demonstrated the feasibility of treating complex industrial-municipal wastes. The predominantly industrial wastes were equalized, neutralized, and treated in a 50-gallon-per minute activated sludge plant. The activated sludge system provided an excess of 90% BOD removal although color characteristics persisted. Carbon column effluent, showing an overall removal of 97% BOD and 93% color, meets all discharge requirements. (See also W74-10765) (Jones-Wisconsin)
W74-10775

REGIONAL WASTEWATER MANAGEMENT SYSTEMS FOR THE CHICAGO METROPOLITAN AREA,
Corps of Engineers, Washington, D.C.
K. B. Cooper.
In: American Ordnance Association Proceedings of 3rd Meeting on Environmental Pollution May 17-18, 1972. Fort McNair, Washington, D.C., p 163-175, 1973. 6 tab.

Descriptors: *Waste water treatment, *Alternate planning, *Sewage districts, Systems analysis, Cost comparisons, Annual costs, Capital costs, Unit costs, Land use, Water reuse, Financial feasibility, Design, Evaluation, *Illinois.
Identifiers: *Chicago(Ill), Per capita costs.

Central to the program of the regional wastewater management systems is the cost and performance of alternative systems. Feasibility reports of the Pilot Wastewater Management Program prepared by the Corps of Engineers contained preliminary cost estimates for alternative waste management systems to achieve high treatment levels. The capital and annual costs presented in the feasibility studies were only preliminary and not as yet fully indicative of the financial or economic costs for any one alternative system. A special study of the Chicago Metropolitan Area was undertaken to formulate least cost waste treatment management system alternatives in order to detail capital costs, operation, maintenance, and replacement costs and to analyze their relative merits. Summarized are criteria and assumptions of this special study, a description of each system including performance and evaluation, and a comparison with feasibility study findings. Assessment included identifying key parameters which were impacted by each of the systems, whereas evaluation established the beneficial and detrimental effects of each, associated opportunities, and the potential net contributions of the systems. Costs used in the feasibility study relied heavily on data generated from small-scale and experimental pilot systems; in the special study actual bid prices were used to the maximum extent possible. (See also W74-10765) (Jones-Wisconsin)
W74-10778

BAGS TO CLEAN UP SEWAGE.
New Scientist, Vol 61, No 890, p 754, March 21, 1974.

Descriptors: *Sewage treatment, Municipal wastes, *Water treatment, Treatment methods, Microorganisms, *Bacteria, Sewers, Pipes, Plastic pipes, *Waste water treatment, *Biological treatment.
Identifiers: Cholera bacteria, Dysentery amoeda, Emergency treatment.

An emergency sewage treatment system that kills cholera bacteria and dysentery amoeda has been developed by James Howard, a public health engineer working for Oxfam. It involves passing sewage into four or more seven meter diameter sausage-shaped neoprene bags filled with water and linked in series by plastic pipes. The water prevents air getting to the microorganisms which settle in the sludge at the bottom of the first neoprene section and die within a week or two. In an emergency, such as an earthquake a single seven meter section would be used when buried at the end of 24 hours. (Murphy-FIRL)
W74-10813

SOUND, OZONE ZAP GERMS.
Water and Wastes Engineering, Vol 11, No 3, p 56, March, 1974.

Descriptors: Water pollution, Water treatment, Treatment methods, *Disinfection, *Ozone, *Pilot plants, *Sound waves, *Waste water treatment.
Identifiers: *Ultra high frequency sounds, Sonication, Sozone treatment.

A wastewater treatment system combining ultra-high frequency sound and ozone is as effective as conventional methods of disinfection and may be superior, according to some scientists at Notre Dame University. Dr. Gary Burleson's research showed that treatment with sonication, ultra high frequency sound, and ozone totally inactivated each of three virus types in 15 seconds and six different bacteria, which cause such diseases as dysentery and cholera, in a minute or less. When sonication is teamed with ozone a synergistic effect seems to occur. A pilot plant using Sozone treatment has been in operation on the Notre Dame campus since 1971. Plans for further research on the ozone-sonication technique are being made to test the technique's effectiveness on other bacteria and viruses. (Murphy-FIRL)
W74-10814

PLANT GETS NEW PROCESS,
Ecolotrol, Inc., Bethpage, N.Y.
J. S. Jeris, and F. J. Flood.
Water and Wastes Engineering, Vol 11, No 3, p 45-48, March, 1974. 2 fig, 2 tab.

Descriptors: Water pollution, Water treatment, Treatment methods, Groundwater, *Water table, Aquifers, *New York, *Aquifer management, *Groundwater recharge, Saline water intrusion, *Waste water treatment.
Identifiers: *Nassau County(NY).

A novel biological denitrification process has been added to Nassau County's wastewater treatment plant. Combining the demands of the increased population with the growth of industry over the past 20 years, the amount of high quality water needed and the corresponding quantity of wastewater requiring treatment has more than tripled. The ground water table has been declining due to the increased demand for water, with a corresponding evidence of salt water intrusion, high nitrate-nitrogen concentration as well as other contaminants. Protection of the ground water was incorporated into a master plan which included a 500,000 mgd advanced wastewater treatment plant. A physical-chemical treatment system was built on the site of Nassau County's 60 mgd wastewater treatment plant at Bay Park. The goals of this plan were to learn what quality water could be obtained using this advanced water renovation plan, to determine the ability and ramifications of recharging treated water into the aquifer, and to obtain the cost of this extensive treatment and recharge operation. Nitrate- and nitrite-nitrogen removal is encouraging. The fluidized granular bed denitrification system show promise in supplanting the biological denitrification processes being used in the field today. (Murphy-FIRL)
W74-10815

CONSTRUCTION AND OPERATION OF A LABORATORY FERMENTER FOR KINETIC MEASUREMENTS IN WASTE WATERS (BAU UND BETRIEB EINES LABORATORIUMS-FERMENTORS FUR KINETISCHE MESSUNGEN AN ABWASSERN),
Institut fuer Organisch-Technisch Chemie. Deutsche Akademie der Wissenschaften zu Berlin, Leipzig (East Germany).
U. Behrens, M. Ringpfeil, H. Thielemann, G. Klappach, and D. Pohland.
Fortschritte Der Wasserchemie, No 15, p 203-215, 1973. 7 fig, 6 ref. English summary.

Descriptors: *Biological treatment, *Water purification, Aeration, *Fermentation, Kinetics, *Waste water treatment, *Treatment facilities.
Identifiers: *Laboratory fermenter.

The construction of a laboratory fermenter for studying biological purification processes in wastewaters is described. It consists of a 16 liter suspended vessel of Jena glass having an efficient aeration system. Biological wastewater treatment can proceed discontinuously, continuously and

continuously with sludge return. Control of temperature and pH value is possible. Carbon dioxide and oxygen are automatically determined in the outgoing air. (Murphy-FIRL)
W74-10816

PIPE JACKING -- A TECHNIQUE FOR SOFT GROUND TUNNELLING,
Cementation Co. Ltd., Calcutta (India).
For primary bibliographic entry see Field 8A.
W74-10821

QUANTITATIVE ESTIMATION OF DISINFECTION INTERFERENCES,
Water Research Association, Marlow (England).
E. S. Hall.
Journal of the Society for Water Treatment and Examination, Vol 22, No 3, p 153-174, 1973. 9 fig, 14 ref.

Descriptors: *Microorganisms, *Disinfection, *Equations, Chlorine, Ammonia, *Mathematical models, *Wastewater treatment, *Water treatment.
Identifiers: Disinfectants.

The inactivation of microorganisms and the reaction of chemical interferences with disinfectant at rates proportional to their concentration conform with the equation,-log base 10 (proportional survival of organism or residual interference) - kD/2.303, where D is the concentration of disinfectant integrated over time and k is a constant. Experimental data do not usually conform with the equation because more than one degree of susceptibility to disinfection or oxidation prevails. Within a certain range of values of D, however, data can be processed to conform and yield a value for k. The relationship between dose of disinfectant and contact time for a given value of disinfection level can then be calculated. Using existing constants for ammonia free chlorine reactions, progress in the formation of chloramines may be related to disinfection level. This enables optimum design of plant and disinfection control systems for a disinfection level appropriate to the water source. (Murphy-FIRL)
W74-10822

OPERATIONAL CONTROL CONCEPTS FOR THE ACTIVATED SLUDGE PROCESS,
Oklahoma State Univ., Stillwater. School of Civil Engineering.
J. H. Sherrand, and D. F. Kincannon.
Water and Sewage Works, Vol 121, No 3, p 44, 56, 64, 66, March, 1974. 2 fig, 2 tab, 4 ref.

Descriptors: *Model studies, *Mathematical models, *Activated sludge, Equations, Control, *Recycling, Microorganisms, *Waste water treatment.
Identifiers: *Continuous culture theory.

Control schemes advocated for recycling activated sludge processes frequently are based on empirical observation. Input of scientific knowledge to control models has been minimal. As a result of the use of microbial continuous culture theory for describing process relationships, several advances toward the understanding of basic process fundamentals have recently been made. The effect of altering process control variables is illustrated by the development of mathematical relationships that are descriptive of the activated sludge process, presentation of data obtained in a laboratory model activated sludge unit, and integration of data and equations to explain the consequences of altering process variables to the treatment plant operator. (Murphy-FIRL)
W74-10824

DESIGNING. PLUG IN A COMPUTER,
Spotts, Stevens and McCoy, Wyomissing, Pa.
F. W. Brill.
Water and Wastes Engineering, Vol 11, No 2, p 39-41, February, 1974. 2 fig.

Descriptors: Automation, Instrumentation, *Waste water treatment, Engineering, *Computer programs, *Plant design.

Programs can be written in such a way that they can be of help in designing small installations where it is impossible to determine the design variables accurately, for example in biological waste treatment plants. The answers given by the computers would be approximate, and would allow selected values to be changed without disturbing any others. Such a program permits the user to try many designs on paper and to determine the effect of ranges of values of design variables. All this is possible using Basic or FORTRAN computer languages in such a way that the user need not know either language. An example is given to illustrate this method. (Murphy-FIRL)
W74-10825

MAGNITUDE OF WASTEWATER TREATMENT AND DISPOSAL PROBLEM FACING THE NATION,
Environmental Protection Agency, Washington, D.C. Office of Water Programs.
K. M. Mackenthun.
In: Underground Waste Management and Environmental Implications, Symposium held December 6-9, 1971, Houston, Texas, p 19-23, 3 fig, 2 tab, 7 ref.

Descriptors: Waste disposal, *Waste water treatment, Industrial plants, *Industrial wastes, Industrial water.
Identifiers: *Industrial pollution.

The response is described of 10,000 water-using industries to a questionnaire designed to collect information on quantity and quality of wastewater constituents and discharge methods. Data from this survey, and others by the Department of Commerce show that more than 300,000 water-using industrial plants discharge three to four times as much oxygen-demanding wastes as all of the nonindustrial wastes discharged to sewerage in the United States. Many wastes discharged by industries are toxic to aquatic life and, perhaps indirectly, to man. The volume of industrial wastewater discharge in 1968 exceeded 14 trillion gal. before treatment. Indications are that more than half of this wastewater volume comes from four major industrial groups: paper, organic chemicals, petroleum refining, and steel. Industrial pollution problems are created by oxygen-demanding wastewater constituents, organic and inorganic settleable solids, suspended solids, floatable materials, toxic metals or substances, nuisance-stimulating nutrients, and waste heat. Treatment and control processes are now available for most industrial wastes; however, some pollutants, including complex chemicals, present difficult abatement problems. (See also W72-14480) (Staplin-NWWA)
W74-10864

NITRATES IN WATER SUPPLIES.
International Water Supply Association, London (England). International Standing Committee on Water Quality and Treatment.
For primary bibliographic entry see Field 5B.
W74-10886

COLUMBUS REPLACES HISTORIC WATER TREATMENT PLANT,
Stilson (Alden E.) and Associates, Ltd., Columbus, Ohio.
K. W. Cosens, and F. Farr, Jr.
Public Works, Vol 105, No 6, p 60-62, June 1974. 1 fig, 1 tab, 1 ref.

Descriptors: *Treatment facilities, *Waste water treatment, Construction materials, Construction costs, Design criteria, Sites, Water supply, *Water treatment, History, *Ohio.
Identifiers: *Columbus(Ohio).

A 65 mgd new plant supply facility is replacing the Dublin Road Plant in Columbus, Ohio. The new treatment plant is being constructed in two phases: the first involving a functional plant of full capacity; and the second involving demolition of old chemical buildings, filters, flocculation and settling tanks, and wash-water facilities, followed by construction of additional clear well capacity, underground piping, a chemical handling facility, lighting, roads, fencing, and landscaping. Treatment consists of screening, coagulation with alum, softening with lime and soda ash or caustic soda, recarbonation, pre- and post-chlorination, taste and odor control, and threshold treatment. Treatment plant construction costs are estimated at $15.5 million. (Sandoski-FIRL)
W74-10888

EFFECT OF PH ON SURVIVAL OF ESCHERICHIA COLI,
Central Public Health Engineering Research Inst., Nagpur (India).
N. M. Parhad, and N. U. Rao.
Journal of the Water Pollution Control Federation, Vol 46, No 5, p 980-986, May 1974. 7 fig, 16 ref.

Descriptors: *E. coli, *Oxidation lagoons, *Bioindicators, Effluents, *Hydrogen ion concentration, *Waste water treatment, Algae, Growth rates, Laboratory tests.

An attempt has been made to delineate the factors affecting bacterial reduction of effluents in stabilization ponds using E. coli as a representative of the indicator bacteria. A 24-hour peptone broth culture of E. coli isolated from waste water was used in these experiments with evaluation by multitube dilution technique using lactose broth in the presumptive test at 37C for 24 to 48 hours. Results are discussed and the following conclusions drawn. The growth of different algae in sterilized waste water results in an increase of pH from 7.5 to 10 or more. Both E. coli and algae can grow together when waste water is buffered at pH 7.5 but E. coli could not grow in waste water when the pH was greater than 9.2. E. coli, when grown in association with algae, is eliminated because of the high pH produced as a result of algal growth. The decrease in E. coli observed in stabilization ponds is attributed to the pH levels that are found in those ponds. (Sandoski-FIRL)
W74-10890

THE AGRICULTURAL USE OF BLACKBURN SEWAGE SLUDGE,
Blackburn County Board Corp. (England).
E. Rawcliffe, and G. W. Saul.
Water Pollution Control, Vol 73, No 2, p 168-177, 1974. 4 fig, 3 tab, 25 ref.

Descriptors: *Agricultural engineering, Soil physics, *Soil conservation, *Sewage sludge, Surveys, *Metals, Topsoil, Soil investigations, *Water reuse, Soil texture, Soil strength.

Experiences associated with agricultural use of Blackburn, England's sewage sludge are described. Over the years, the repeated addition of sewage sludge to the Blackburn estate has had a physical effect on the surface of the land. The soil became soft and waterlogged, and the frequency of application as practiced precluded any remedial action by means of plowing. Work has now commenced on a complete soil survey of the whole sewage works estate with special reference being given to metals. The present policy regarding the new areas of farmland now being treated with digested sludge by mobile tankers is to acquire the use of sufficient land so that over the next thirty years at least the accumulation of metals conforms to well within the suggested limits of 250 mg per liter zinc equivalent in the top soil. (Sandoski-FIRL)
W74-10895

5E. Ultimate Disposal Of Wastes

WASTEWATER TREATMENT AND DISCHARGE SURVEY, OFFUTT AFB NE, OCT 1973,
Environmental Health Lab., Kelly AFB, Tex.
For primary bibliographic entry see Field 5D.
W74-10355

STATE OF THE ART REPORT ON MARINE SANITATION DEVICES,
Automation Industries, Inc., Silver Spring, Md. Vitro Labs. Div.
For primary bibliographic entry see Field 5D.
W74-10360

STATE OF MARYLAND WASTE OIL RECOVERY AND REUSE PROGRAM,
Environmental Quality Systems, Inc., Rockville, Md.
For primary bibliographic entry see Field 5D.
W74-10539

(CITY OF SUDBURY, ONTARIO, CANADA).
For primary bibliographic entry see Field 5D.
W74-10555

AN EXPERIMENT ON DISPOSAL OF METAL WORKING OIL EMULSION INTO SEWER SYSTEMS (KINZOKU KAKOYU NO HAISUI SHORI NI KANSURU ICHI JIKKEN),
Kao Soap Co., Tokyo (Japan). Industrial Research Labs.
For primary bibliographic entry see Field 5D.
W74-10559

REGIONAL LANDFILL AND CONSTRUCTION MATERIAL NEEDS IN TERMS OF DREDGED MATERIAL CHARACTERISTICS AND AVAILABILITY: VOLUME I: MAIN TEXT; VOLUME II: APPENDIXES,
Green Associates, Inc., Towson, Md.
For primary bibliographic entry see Field 5G.
W74-10624

OCEAN WASTE DISPOSAL IN THE NEW YORK BIGHT,
Interstate Electronics Corp., Anaheim, Calif. Oceanics Div.
For primary bibliographic entry see Field 5B.
W74-10655

THE STRANGE WORLD OF MISCIBLE DISPLACEMENT,
Louisiana State Univ., Baton Rouge. Dept. of Civil Engineering.
For primary bibliographic entry see Field 5B.
W74-10664

PRACTICES AND PROBLEMS IN THE CONFINEMENT OF DREDGED MATERIAL IN CORPS OF ENGINEERS PROJECTS,
Army Engineer Waterways Experiment Station, Vicksburg, Miss. Soils and Pavements Lab.
W. L. Murphy, and T. W. Zeigler.
Technical Report D-74-2, May 1974. 176 p, 44 fig, 3 tab, 52 ref, 4 append.

Descriptors: *Dredging, *Waste disposal, *Water pollution control, Sediments, Water pollution sources, Spoil banks, Landfills, Sediment control.
Identifiers: *Dredging wastes.

Confined disposal of dredged material is increasing because of recent requirements for containment of dredged material that is considered polluted and the resulting curtailment of much open water disposal. A diminishing supply of suitable disposal areas, caused by filling of existing sites and difficulties in acquiring sites because of environmental or cultural constraints, has become a major problem. Long-distance piping of dredged material, diking of disposal areas in water, and acquisition of permanent disposal facilities are possible solutions to this problem. (Knapp-USGS)
W74-10665

LITERATURE REVIEW ON RESEARCH STUDY FOR THE DEVELOPMENT OF DREDGED MATERIAL DISPOSAL CRITERIA,
Texas Univ., Dallas. Inst. for Environmental Studies.
For primary bibliographic entry see Field 5B.
W74-10686

SANITARY LANDFILL LEACHATE INTERACTIONS WITH A CARBONATE-ROCK DERIVED SOIL IN CENTRAL PENNSYLVANIA,
Pennsylvania State Univ., University Park. Dept. of Geology and Geophysics.
For primary bibliographic entry see Field 5B.
W74-10827

MAGNITUDE OF WASTEWATER TREATMENT AND DISPOSAL PROBLEM FACING THE NATION,
Environmental Protection Agency, Washington, D.C. Office of Water Programs.
For primary bibliographic entry see Field 5D.
W74-10864

BASIC DISPOSAL-WELL DESIGN,
Du Pont de Nemours (E.I.) and Co., Wilmington, Del. Engineering Service Div.
For primary bibliographic entry see Field 5B.
W74-10865

DEEP-WELL ACID DISPOSAL--PLANNING AND COMPLETION,
Halliburton Services, Duncan, Okla.
For primary bibliographic entry see Field 5B.
W74-10866

REQUIREMENTS FOR THE MONITORING OF INDUSTRIAL DEEP-WELL WASTE-DISPOSAL SYSTEMS,
Dow Chemical Co., Houston, Tex.
For primary bibliographic entry see Field 5B.
W74-10867

CONTROL OF UNCONSOLIDATED SANDS IN WASTE-DISPOSAL WELLS,
Subsurface Disposal Corp., Houston, Tex.
For primary bibliographic entry see Field 8A.
W74-10868

DEEP DISPOSAL SYSTEMS FOR RADIOACTIVE WASTES,
Office of Environmental Affairs (AEC), Washington, D.C.
For primary bibliographic entry see Field 5B.
W74-10869

LIABILITY FOR HARM FROM UNDERGROUND WASTE DISPOSAL,
Wyoming Univ., Laramie.
For primary bibliographic entry see Field 5B.
W74-10870

REGULATION OF SUBSURFACE DISPOSAL IN TEXAS,
Texas Water Development Board, Austin.
For primary bibliographic entry see Field 5B.
W74-10871

5F. Water Treatment and Quality Alteration

OZONE TREATS ARCTIC WATERS,
Arctic Health Research Centre, College, Alaska. Environmental Sciences Branch.
L. C. Reid, and H. S. Potworowski.
Water and Pollution Control, Vol 112, No 3, p 53-55, March 1974. 6 fig, 2 tab.

Descriptors: *Water purification, *Ozone, *Arctic, Iron, Manganese, Organic matter, Color, *Water treatment, Investigations, Filtration, Sedimentation, Tastes, Groundwater, *Alaska.

The application of ozone as a useful water conditioner for cold water sources was investigated for water supplies in Alaska. It is feasible to use ozone for iron, manganese, organics, and color removal in cold waters. From the results obtained, it would appear that ozone may be the answer to the need for better iron and manganese removal from arctic water suppliers. If the water is of acceptable hardness after removal of iron and manganese, the only treatment of the raw water would be for ozonation, sedimentation, and filtration. The resulting water would be free of odors and obnoxious tastes, and would be clear. Staining of clothes and fixtures would be eliminated. A side benefit of the ozonation process would be the purification. It is recommended that an attempt be made to develop a pilot ozonation plant that would treat groundwater for removal of iron, manganese, color, and organics. (Merritt-FIRL)
W74-10556

WATER TREATMENT CHEMICALS.
For primary bibliographic entry see Field 5D.
W74-10565

TOWN 'CAPTURES' NATURAL SPRING: CUTS WATER TREATMENT COSTS,
Allen and Hoshall, Memphis, Tenn.
L. B. Allen.
The American City, Vol 89, No 5, p 65-66, May 1974.

Descriptors: *Water supply development, *Groundwater, *Water sources, *Springs, Dams, Reservoirs, Costs, *Tennessee, Hydrogen ion concentration, *Water treatment.

The city of Elizabethton, Tennessee found that groundwater from springs could be used to increase water-supply capabilities by 40 percent. By building an earth cofferdam around the springs discharge area, a concrete receiving reservoir could act as a pump sump. The operating and maintenance costs for the 1.4 mgd Valley Forge Spring are very low. The water has a pH of 8.7 and is noncorrosive, has no bacteria harmful to public health, and should provide adequate supply through 1980. (Prague-FIRL)
W74-10567

ORGANIZATION AND SANITARY-HYGIENIC EVALUATION OF THE DRINKING WATER SUPPLY OF OIL AND GAS REGIONS OF THE NORTHERN OB AREA, (IN RUSSIAN),
Tyumenskii Gosudarstvennyi Meditsinskii Institut (USSR).
V. I. D'Yakov.
Gig Sanit. Vol 37, No 10, p 95-96, 1972.
Identifiers: Hygienic evaluation, Oil and gas regions, *Ozonization, Sanitary conditions, *USSR(Siberia-Northern Ob area), Potable water, *Water treatment, Public health, *Decontamination.

Under the climatic conditions of Siberia processes of natural self-purification of water occur extremely slowly. It is expedient to use ozonization as a more effective method of decontaminating

drinking water, especially in regions unfavorable in sanitary and epidemiological respects, such as in oil and gas producing regions.--Copyright 1973, Biological Abstracts, Inc.
W74-10581

THE EFFICACY OF USING ACTIVATED CARBON FOR FINAL PURIFICATION OF DRINKING WATER, (IN RUSSIAN),
Permskii Politekhnicheskii Institut (USSR).
Ya. I. Vaisman, S. Ya., Barikhin, S. L.
Glushankov, E. A. Kovaleva, and A. M. Korkin.
Gig Sanit. Vol 37, No 7, p 106-108, 1972.
Identifiers: *Activated carbon filters, Water purification, Potable water, Filters, *Water treatment, *Filtration, *Organoleptic properties.

Compact activated carbon filters, either in water works, or in consumer units, could be used for improving the organoleptic properties of drinking water.--Copyright 1973, Biological Abstracts, Inc.
W74-10599

DETERMINATION OF INVESTMENT COST FUNCTIONS OF WATER TREATMENT PLANTS,
Illinois Univ., Urbana. Dept. of Business Administration.
H. Hinomoto.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-234 547, $3.25 in paper copy, $2.25 in microfiche. Illinois Water Resources Center, Urbana, Research Report No. 87, 1974. 35 p, 8 tab, 2 fig, 9 ref. OWRR A-055-ILL(2). 14-31-0001-3513.

Descriptors: Water treatment, Surface waters, *Treatment facilities, *Investment, Economies of scale, *Diseconomies of scale, *Cost comparisons, *Cost analysis, *Cost trends.
Identifiers: *Cost functions, Investment costs.

Functions representing the relationship between the capacity of a water treatment plant and its investment cost are found in studies by Orlab and Lindorf, by Koening, and by Ackermann. These functions were based on samples of plants constructed in the long period of 1930's - early 1960's. To update the above studies, this study determines similar investment cost functions for the surface-water and ground-water plants, using samples of plants mostly constructed in the short period of 1968-1971. Further, it determines similar cost functions for major components of each type of plant that have not been available in the past studies. A significant difference exists between the result of this study and the results of the past studies on the surface-water plant. The cost functions of the past studies indicate economies of scale in investment cost, whereas the function of this study indicates small but positive diseconomies of scale.
W74-10691

QUANTITATIVE ESTIMATION OF DISINFECTION INTERFERENCES,
Water Research Association, Marlow (England).
For primary bibliographic entry see Field 5D.
W74-10822

COLUMBUS REPLACES HISTORIC WATER TREATMENT PLANT,
Stilson (Alden E.) and Associates, Ltd., Columbus, Ohio.
For primary bibliographic entry see Field 5D.
W74-10888

IS THE WATER SAFE TO DRINK. PART I: THE PROBLEM,
Environmental Defense Fund, Washington, D.C. Water Resources Program.
R. H. Harris, and E. M. Brecher.
Consumer Reports, Vol 39, No 6, p 436-443, June 1974.

Descriptors: *Domestic water, *Public health, *Water pollution, *Potable water, *Water quality standards, Accidents, Contamination, Costs, Water supply, *Attitudes.

The United States is currently in the process of implementing a mammoth Federal-state program to clean up its waterways. Even if this program proceeds on schedule, it will take more than a decade to achieve its goals. Faster action is urged on a program to upgrade the drinking water now being used in over 40,000 community water systems. The reasons given for urging such a program include the fact that even if all man-made pollution were eliminated, there would still be natural sources of pollution that would necessitate purification operations. There will always be some pollution from accidental spills or discharges, and agricultural runoff, if water pollution abatement is put off as air pollution abatement has been, the United States will be drinking dirty water for some time to come. The costs of improving drinking water now are reasonable enough in view of the extra health protection which would be gained. Types of pollution discussed include: asbestos, bacteria, viruses, heavy metals, and organic compounds. (Shaffer-FIRL)
W74-10897

5G. Water Quality Control

WATER QUALITY STANDARDS SUMMARY FOR INTERSTATE WATERS OF THE COMMONWEALTH OF VIRGINIA.
Environmental Protection Agency, Philadelphia, Pa.; and Virginia State Water Control Board, Richmond.
Available from NTIS, Springfield, Va. 22161 as PB-227 213, Price $11.75 printed copy; $2.25 microfiche. Virginia State Water Control Board, Summary Report, 1971. 149 p, 71 fig, 37 tab.

Descriptors: *Water pollution control, *Federal Water Pollution Control Act, *Virginia, Water quality act, Water quality control, *Water quality standards.
Identifiers: Water quality standards(Va).

The Commonwealth of Virginia adopted a policy to protect its high quality interstate waters, and amended their standards effective July 20, 1970. It is the public policy of the Commonwealth of Virginia that waters whose existing quality is better than the established standards as of the date on which such standards become effective will be maintained at high quality; provided that the Commonwealth of Virginia has the authority to approve any project or development which would constitute a new or an increased discharge of effluent to high quality water, when it has been affirmatively demonstrated that a change is justifiable to provide necessary economic or social development, and provided further, that the necessary degree of waste treatment to maintain high water quality will be required where physically and economically feasible. Present and anticipated use of such waters will not be precluded. (Knapp-USGS)
W74-10354

PORT COLLECTION AND SEPARATION FACILITIES FOR OILY WASTES, VOLUMES I-IV,
Harris (Frederic R.) Inc., New York.
For primary bibliographic entry see Field 5D.
W74-10357

POLLUTION ABATEMENT; DISPOSABILITY RATINGS OF PACKAGING MATERIALS USED ABOARD UNITED STATES NAVAL SHIPS,
Naval Ship Research and Development Center, Annapolis, Md. Materials Dept.
H. E. Achilles.
Available from NTIS, Springfield, Va. 22161, AD-774 475, Price $3.25 printed copy, $2.25 microfiche. Report No 4196, Vol 1, January 1974. 34 p, 1 fig, 8 tab, 11 ref.

Descriptors: *Waste disposal, *Ships, *Solid wastes, Water pollution sources, Water pollution control, Sea water.
Identifiers: *Packaging wastes.

A major effort in the Navy's environmental protection program is to minimize the quantity of solid waste that ships must dispose of at sea. Packaging and packaging materials associated with supply items are a major component of shipboard solid wastes. Criteria for rating shipboard disposability characteristics of packaging materials constrained by shipboard process capabilities to handle the materials are presented. (Knapp-USGS)
W74-10398

ECOLOGY OF ANOPHELES (M.) PULCHERRIMUS THEOB. IN IRRIGATED DESERTS, (IN RUSSIAN),
Ashkhabadskii Institut Epidemiologii i Gigieny (USSR).
G. A. Babayants.
Med Parazitol Parazit Bolezn. Vol 41 No 5, p 524-531, 1972. Illus.
Identifiers: *Arid land reclamation, *Mosquitoes, Anopheles-hyrcanus, *Anopheles-pulcherrimus, Anopheles-Superpictus, Cattle, Deserts, Ecology, *Irrigated deserts, Land reclamation, *USSR(Turkmen-Kara Kum canal).

The reclamation of arid land through the building of the Kara Kum canal (Turkmen SSR, USSR) affected the mosquito population in that area. Of 21 spp. found, the most abundant were Anopheles pulcherrimus (6.1-19.6%), A. hyrcanus and A. superpictus. The highest number of larvae (77.9%) were found in densely overgrown bodies of water throughout the year. Mosquitoes were attracted to human and domestic animal inhabited areas, especially cattle barns. The first larvae of the 4th instar appeared in the beginning of April and the imago in the second half of April. Many larvae also survived the winters. In SE Kara Kum the greatest number of mosquitoes were found in Sept. The wide distribution of the mosquitoes hinders control of the adult; instead, the larvae must be controlled.--Copyright 1973, Biological Abstracts, Inc.
W74-10406

PLANNING AND WASTEWATER MANAGEMENT OF A COMBINED SEWER SYSTEM IN SAN FRANCISCO,
Colorado State Univ., Fort Collins. Dept. of Civil Engineering.
For primary bibliographic entry see Field 5D.
W74-10413

OPTIMIZATION TECHNIQUES FOR MINIMIZATION OF COMBINED SEWER OVERFLOW,
Dept. of Civil Engineering. Colorado State Univ., Fort Collins.
For primary bibliographic entry see Field 5D.
W74-10415

RHODE ISLAND'S OCEAN SANDS: MANAGEMENT GUIDELINES FOR SAND AND GRAVEL EXTRACTION IN STATE WATERS,
Rhode Island Univ., Kingston. Coastal Resources Center.
M. J. Grant.
Available from NTIS, Springfield, Va 22151 as COM-74-10158, Price $3.50 printed copy; $2.25 microfiche. Marine Technical Report No 10, 1973. 51 p, 24 fig, 153 ref.

Descriptors: *Mining, *Sands, Gravels, *Rhode Island, *Aggregates, Construction materials, Dredging, Regulation, Legislation, Environment, Water pollution control.

The marine sand and gravel mining industry was studied to project its probable impact on Rhode Island's marine environment. A model legislative proposal is given for the regulation of hard mineral mining in Rhode Island State waters. Trends in the sand and gravel industry will make it necessary to manage Rhode Island's offshore and estuarine sand and gravel resources. U.S. comsumption of sand and gravel is accelerating. An annual consumption of 500 million tons in 1954 had nearly doubled to 980 million tons by 1970, and it is projected that 1,670 million tons will be consumed in 1985 and 2,530 million tons in 2000. The demand for aggregate material is greatest in metropolitan areas where residential, industrial and construction users are concentrated. The low unit value of the resource and the high cost of transportation dictate minimal separation of quarry and market. The producers of sand and gravel, however, are being prevented by suburban expansion, zoning restrictions and high land costs from developing new close-in deposits as those presently worked are depleted. As land supplies dwindle and costs rise, it becomes increasingly attractive to look elsewhere for cheap and reliable sources. Extensive, nearby and high quality deposits are found in several areas off the New England coast. Rhode Island legislation relevant to marine mining has a number of powers which might usefully be applied to the regulation of marine sand or gravel mining. More specific legislation is needed and a Proposed Regulatory System is included as an appendix to this study. (Knapp-USGS)
W74-10437

DEVELOPMENT OF A BATCHWISE IN-SITU REGENERATION TYPE SEPARATOR TO REMOVE OIL FROM OIL-WATER SUSPENSIONS,
Hydronautics, Inc., Laurel, Md.
For primary bibliographic entry see Field 5D.
W74-10441

TEST AND EVALUATION OF OIL POLLUTION ABATEMENT DEVICES FOR SHIPBOARD USE, PHASE II,
Coast Guard, Washington, D.C. Naval Engineering Div.
For primary bibliographic entry see Field 5D.
W74-10444

STUDY ON THE REMOVAL OF INORGANIC AND ORGANIC MERCURY IN WASTE WATER BY THE FLOTATION METHOD,
Kyoto Univ.,(Japan). Dept. of Mineral Science and Technology.
For primary bibliographic entry see Field 5D.
W74-10470

PRITTLE BROOK DIVERSION TUNNEL,
For primary bibliographic entry see Field 8A.
W74-10482

MOLECULE SEPARATOR,
LKB - Produkter A.B., Bromma (Sweden).
For primary bibliographic entry see Field 8A.
W74-10491

SAFETY INSTALLATIONS FOR THE PREVENTION OF POLLUTION THROUGH LEAKAGE IN A PIPELINE,
For primary bibliographic entry see Field 5D.
W74-10494

PROCESS AND APPARATUS FOR THE SEPARATION OF LIQUID MIXTURES,
For primary bibliographic entry see Field 5D.
W74-10495

ANNUAL STATE STRATEGY FOR WATER QUALITY CONTROL, FISCAL 1973-74.
California State Water Resources Control Board, Sacramento.
July 1973. 143 p, 11 append.

Descriptors: *Estuaries, *Water quality control, *Water resources development, *Pollution abatement, *Water policy, California, Water demand, Water conservation, Project planning, Administration, Legislation, Groundwater basins, Sea water, Water quality, Water resources, Water supply.

Presented are a statewide assessment of water quality problems and their causes, a listing of the geographical or discharger priorities of these problems, and a listing of the priorities and scheduling of permits, construction grants, basin plans and other appropriate program actions that make up California's water quality control strategy. California's water quality problems and causes are assessed in a general manner. Three categories of problems are addressed: inland surface waters and estuaries, marine waters and groundwater, and the National Water Strategy. The criteria to be used in making the strategy responsive to the state's geographical priorities are discussed. These criteria, including the severity of pollution problems, the population affected and the need for preserving high quality waters, are used to rank surface water bodies, ground-water basins and the discharges to each. Strategic objectives and an implementation of the plan are described as are the objectives of eleven state water quality management programs and the strategy each will employ to correct pollution problems. (Sutton-Florida)
W74-10502

THE BLACK TIDE,
Washington Univ., Seattle. Center for the Biology of Natural Systems.
J. McCaull.
Environment, Vol 11, p 2-16, November 1969. 8 photo, 25 ref.

Descriptors: *Oil industry, *Oil wastes, *International waters, *Wildlife conservation, Food chains, Water birds, Fishing, Recreation, Exploitation, Oily water, Water pollution sources, Oil wells, Boats, Photosynthesis, Chemical wastes, Oxygen, Oil spills, Water pollution control.
Identifiers: *Coastal waters.

There is a great danger of serious pollution from the all out search for oil. The short term biological effects of crude oilspills appear to be limited to the destruction of waterfowl. They also posed a longer range threat to marine life, the fishing industry, recreation, and the habitats of animals and plants. Most oil spills have resulted from numerous tanker mishaps, which generally occur near ports. With increased tonnage and ships the probability of more mishaps is greater. Offshore drilling also contributes to pollution, as well as the discharge of oily ballast by ships. Though oil loses much of it toxicity after being weathered in the ocean, the amount of oil dumped in the ocean is equal to the amount of natural hydrocarbons produced there. Fuel oil is much more toxic than crude oil. Several methods have been employed to disperse oil including straw and chemical dispersants. However, these chemicals are potentially more dangerous than the oil they disperse. As of yet there are no reliable countermeasures that can be taken after there is an oil spill. (Sperling-Florida)
W74-10505

THE FEDERAL OCEAN PROGRAM. THE ANNUAL REPORT OF THE PRESIDENT TO THE CONGRESS ON THE NATION'S EFFORTS TO COMPREHEND, CONSERVE, AND USE THE SEA.
Office of Science and Technology, Washington, D.C.
For primary bibliographic entry see Field 6E.
W74-10506

OIL POLLUTION CONTROL.
For primary bibliographic entry see Field 6E.
W74-10509

IN RE MAINE CLEAN FUELS, INC. (JUDICIAL REVIEW OF DENIAL OF APPLICATION FOR PROPOSED OIL REFINERY).
For primary bibliographic entry see Field 6E.
W74-10510

NEW ENGLAND RIVER BASINS COMMISSION 1973 ANNUAL REPORT.
New England River Basins Commission, Boston, Mass.
For primary bibliographic entry see Field 6E.
W74-10512

WATER POLLUTION--PROHIBITIONS.
For primary bibliographic entry see Field 6E.
W74-10516

ASKEW V. AMERICAN WATERWAYS OPERATORS, INC., REVISITED (COMMENTARY).
Natural Resources Journal, Vol 14, p 153-156, January 1974.

Descriptors: *Oil spills, *Federal-state water rights conflicts, *Judicial decisions, *Water Quality Act, *Federal Water Pollution Act, Legislation, Navigable waters, Oil, Oil industry, Water pollution, Water pollution sources, Water pollution control, Federal government, State governments, Constitutional law, Legal aspects, Water law, *Florida, Oil pollution, Adoption of practices, Pollution abatement, Water quality.

In 1971, a federal court ruled that the Florida Oil Spill and Pollution Control Act was unconstitutional, declaring it to be in conflict with the Water Quality Improvement Act (WQIA), an amendment to the Federal Water Pollution Control Act (FWPCA). But in 1973, the United States Supreme Court reversed that decision, declaring that the Florida legislation was an exercise of Florida's police power over maritime matters and was considered a vital part of an integrated effort to control oil pollution. The main objection to the Florida legislation in the lower court stemmed from its imposition of much stricter standards of liability than were imposed by the WQIA. The Florida Act also leaves the offender little chance of formulating a valid defense, while the WQIA excuses spillage caused by governmental negligence, third party acts, acts of God, or acts of war. The Florida legislation was also viewed as being in direct conflict with federal legislation governing disposition of claims involving coastal oil pollution. However, the Supreme Court found the provisions of the Florida legislation not to be in conflict with the WQIA, but rather supplementary to it, and therefore constitutional. (Ritchie-Florida)
W74-10518

LEGISLATIVE HISTORY OF FEDERAL RIVER BASIN PLANNING ORGANIZATIONS,
For primary bibliographic entry see Field 6E.
W74-10520

SIERRA CLUB V. MASON (MOTION TO VACATE INJUNCTION BARRING HARBOR DREDGING PROJECT).
For primary bibliographic entry see Field 6E.
W74-10522

ENVIRONMENT IMPACT REQUIREMENTS IN THE STATES: NEPA'S OFFSPRING,
Center for California Public Affairs, Claremont.
For primary bibliographic entry see Field 6E.
W74-10527

RECONNAISSANCE OF THE FLUSHING CHARACTERISTICS AND WATER QUALITY IN COASTAL CANALS OF THE GULF OF MEXICO,
University Southern Mississippi, Hattieburg.
For primary bibliographic entry see Field 5B.
W74-10531

SURVIVAL OF ESCHERICHIA COLI IN OLIGOTROPHIC WATERS,
Washington State Univ., Pullman. Dept. of Civil and Environmental Engineering.
For primary bibliographic entry see Field 5C.
W74-10535

WASTEWATER ABATEMENT IN CANNING VEGETABLES BY IQB BLANCHING,
Wisconsin Univ., Madison. Dept. of Food Science.
For primary bibliographic entry see Field 5D.
W74-10545

LEGAL ASSURANCES OF ADEQUATE FLOWS OF FRESH WATER INTO TEXAS BAYS AND ESTUARIES TO MAINTAIN PROPER SALINITY LEVELS,
Texas Univ., Austin. School of Law.
For primary bibliographic entry see Field 6E.
W74-10549

SANITARY LANDFILL THREATENS LAKE.
For primary bibliographic entry see Field 5B.
W74-10553

PROCESS DESIGN AND OPERATION FOR ZERO EFFLUENT DISCHARGE,
Environmental Science and Engineering, Inc., Gainesville, Fla.
For primary bibliographic entry see Field 5D.
W74-10554

ASH-HANDLING SYSTEM ELIMINATES RUNOFF POLLUTION.
Electrical World, Vol 181, No 4, p 50-51, February 15, 1974. 5 fig.

Descriptors: *Runoff, *Water quality standards, *Automation, Solid wastes, *Waste disposal, Sluices, Pumps, Recirculated water, Water pollution control, *Recycling, *Waste treatment.
Identifiers: *Ash handling systems.

The elimination of runoff from the ash handling operation at Niagara Power Corporation's Dunkirk Station to meet newly adopted local water quality standards is described. The water was recirculated to sluice pumps, commercially acceptable dry ash was generated, and a means for disposing of that ash was provided. The system is highly automated and requires less operator attention than the previous ash handling method. In addition to eliminating pollution, the new system permits townships to use the bottom ash on roads. Before installation of the system, ash from the settling ponds had to be loaded into trucks with a front end loader which took considerable time. Now dump trucks can be filled almost instantaneously. Most of the ash is now used by local municipalities for road construction, the rest is being used as cover at a fly ash landfill location. (Merritt-FIRL)
W74-10564

NEW OIL SPILL CLEANUP TOOL FOR COMMERCIAL PRODUCTION.
Oil Week, Vol 25, No 8, p 30, April 8, 1974.

Descriptors: *Oil spills, *Water purification, Oil pollution, Water pollution control, Flow, *Floats, *Canada, *Separation techniques, Pollution abatement.
Identifiers: *Booms.

The first effective tool for containing and cleaning up oil spills in medium to fast moving waters will shortly go into commercial production. The Petroleum Association for the Conservation of the Canadian Environment developed a boom which consists of two inflated floats cased in a fabric, each about 50 ft long between which is suspended netting and a special nonwoven material. It is placed across the current flow at an angle and some oil is diverted by the leading float toward the downstream end for recovery. Most of the oil flows with the water under the leading float, passes through the netting and flows along the face of the nonwoven fabric which is designed to permit the water to pass through, but not the oil. The oil comes to the surface of the ponded area between the two floats, where a tangential current carries it to the downstream end of the boom where it is collected and recovered. The boom weighs only 2 lb/ft and can be shortened or lengthened in sections. (Merritt-FIRL)
W74-10566

A MATHEMATICAL MODEL OF A RIVER PURIFICATION LAKE,
Severn River Authority (England).
For primary bibliographic entry see Field 5C.
W74-10571

FLOATING BOOM,
Pacific Pollution Control, San Francisco, Calif. (assignee)
N. D. Tanksley.
U S Patent No 3,807,178, 7 p, 7 fig, 9 ref; Official Gazette of the United States Patent Office, Vol 921, No 5, p 1809, April 30, 1974.

Descriptors: *Patents, *Oil spills, *Oil pollution, *Pollution abatement, Water quality control, Water pollution control, Equipment, Barriers, Separation techniques, Floats.
Identifiers: *Booms.

The floating boom comprises a sheet-like barrier, having several floats which are removable. The floats are formed with a frame having a movable portion for movement into and out of engagement. The frame includes a pair of juxtaposed upright sections hinged securely at the lower ends of the upright parts. The float elements are secured to the frame in an outrigger type of construction which enhances stability of the water and provides a channel between the floats and the partition for passage of oil and water. The frame, including arm members, may be formed of 304 stainless steel, with the upright members having a U-shaped channel cross section for additional rigidity. (Sinha-OEIS)
W74-10579

FLOATING BOOM STRUCTURES,
Sanera Projecting A.B., Nordmaling (Sweden). (assignee)
P. O. Oberg.
U S Patent No 3,807,177, 5 p, 11 fig, 9 ref; Official Gazette of the United States Patent Office, Vol 921, No 5, p 1808, April 30, 1974.

Descriptors: *Patents, *Oil spills, *Oil pollution, *Pollution abatement, Water quality control, Water pollution control, Equipment, *Barriers, *Flotsam, Separation techniques.
Identifiers: *Booms.

A boom has a curtain of cloth-like material depending vertically in the water and being supported by buoyant bodies. The vertical position is maintained by weights attached to the lower edge of the curtain. The buoyant bodies comprise hermetically sealed buoyant bags of soft cloth material which is impermeable to liquid. They enclose a constant quantity of gas, preferably air. They are attached to the curtain so that the quantity of gas enclosed in each buoyant bag when subjected to water pressure as the boom is placed in the water can be freely pressed up towards an upper portion of the buoyant bag to create in this portion a balloon-like swelling. (Sinha-OEIS)
W74-10580

FLOATAGE COLLECTING APPARATUS AND METHOD,
JBF Scientific Corp., Burlington, Mass.
J. H. Farrell, R. A. Bianchi, and E. E. Johanson.
U S Patent No 3,804,251, 8 p, 8 fig, 9 ref; Official Gazette of the United States Patent Office, Vol 921, No 3, p 1027, April 16, 1974.

Descriptors: *Patents, *Oil spills, *Oil pollution, *Flotsam, *Pollution abatement, Water pollution control, Water quality control, Skimming, *Separation techniques.

Equipment incorporates a surface craft carrying an endless belt. The lower flight of the belt forms a downward and forward facing inclined surface which is openly exposed to the water at the bow of the craft. A well-like open-bottomed enclosure is at the aft end of the lower flight of the belt. A drive mechanism moves the belt to advance the lower flight from the forward roller to the rearward and lower submerged roller surface. This motion carries flotsam or oil downward. At the submerged aft roller surface, the belt turns upward, discharging the flotsam or oil trapped under it into the enclosure. The open-bottomed enclosure is fitted with a baffle structure. As the 'floatage' accumulates it displaces the water. An optional plate spaced below the baffle to diminish the passage of turbulent currents into the enclosure (well) is provided. (Sinha-OEIS)
W74-10587

BOOM ARRANGEMENT FOR CONFINING OIL,
G. Van't Hof.
U.S. Patent No 3,803,848, 5 p, 5 fig, 2 ref; Official Gazette of the United States Patent Office, Vol 921, No 3, p 924, April 16, 1974.

Descriptors: *Patents, *Oil spills, *Oil pollution, Water pollution control, Water quality control, *Pollution abatement, Equipment, Barriers.
Identifiers: *Booms.

A boom arrangement comprises a plurality of buoyant, bar-like parts elongated in a vertical direction and connected in side by side abutment in an elongated wall having a generally arcute plan. Several arcs may be connected to form a sinusoidal wall. The individual bar-like parts have a trapezoidal cross-section with non-parallel sides abutting in sets to form a series of arcs alternately concave towards opposite sides of the wall. A prestressing cable extending along the generally sinusoidal assembly provides rigidity, and means are provided for holding the parts in abutment. Several of such floating walls can be interconnected for surrounding, confining or sweeping a spill of oil or the like. An arcuate wall can be formed by interconnecting curved segments all facing in the same direction. (Sinha-OEIS)
W74-10591

ROUGH WATER BARRIER,
D. P. Hoult, and J. H. Milgram.
U.S. Patent No 3, 802,201, 6 p, 12 fig, 5 ref; Official Gazette of the United States Patent Office, Vol 921, No 2, p 498, April 9, 1974.

Descriptors: *Patents, *Oil spills, *Oil pollution, *Pollution abatement, Water pollution control, Water quality control, Equipment, *Barriers.

The barrier for use in rough water to contain oil or flotsam includes a deformable barrier sheet disposed vertically in the water. Flotation elements are mounted so as to maintain the barrier generally perpendicular to the wave surface. Each flotation element includes two large diameter

cylindrical portions and a smaller diameter cylindrical portion. These portions are interconnected in a 'dumbbell' arrangement with the axis generally parallel to the local surface of the water. It was found that the 'dumbbell' shape has a lower apparent mass in heave than a straight cylinder of the same maximum diameter and length, the better to follow the waves. The barrier curtain is provided with a series of rigid reinforced or supporting elements in the form of reinforced fiberglass strips extending from the top to the bottom of the curtain. The flotation elements are attached at right angles to the fiberglass strips. (Sinha-OEIS)
W74-10595

A STUDY OF DIISOPROPYLGUANIDINE AND DIISOPROPYLGUANIDINE HYDROCHLORIDE TO DETERMINE THEIR HYGIENIC LEVELS IN WATER BODIES, (IN RUSSIAN),
Nauchno-Issledovatelskii Institut Epidemiologii i Mikrobiologii, Lvov (USSR).
For primary bibliographic entry see Field 5C.
W74-10598

A METHODOLOGY FOR POWER PLANT SITE SELECTION AT THE RECONNAISSANCE LEVEL,
Long Island Lighting Co., Mineola, N.Y. Environmental Engineering Dept.
For primary bibliographic entry see Field 6G.
W74-10602

WATER POLLUTION BEING FOUGHT BY COMPUTER.
The American City, Vol 89, No 5, p 71-72, May, 1974.

Descriptors: *Model studies, *Water quality control, Rivers, *Ohio, Simulation, Municipal wastes, Industrial wastes, Costs, Flow, Pollution, Effluents, Conservation, *Data collections, Treatment facilities.
Identifiers: River use, *Miami Conservancy District(Ohio), *Dayton(Ohio).

The Miami Conservancy District of Dayton, Ohio is collecting massive data on river use to determine factors that influence water quality. By using the data given the computer, both real and projected conditions can be simulated and forecast. The costs of the program are distributed among 20 municipal and county treatment plants, 15 paper mills, 20 other industries, 5 power plants and 5 counties, in proportion to how much they discharge into the river. Each engineer of the district collects statistical reports on flow or pollution conditions, with which other factors--such as influent or effluent rates--may be compared. (Prague-FIRL)
W74-10610

MARITIME ACCIDENTAL SPILL RISK ANALYSIS: PHASE I: METHODOLOGY DEVELOPMENT AND PLANNING,
Operations Research, Inc., Silver Spring, Md.
For primary bibliographic entry see Field 5B.
W74-10619

ULTRAFILTRATION CONCEPT FOR SEPARATING OIL FROM WATER,
Abcor, Inc., Cambridge, Mass.
For primary bibliographic entry see Field 5D.
W74-10620

PLANNING, EQUIPMENT AND TRAINING FOR OIL POLLUTION CONTROL,
M. F. Smith, and P. Lane.
Published by Speed Offset Printing Inc for Slickbar, Inc., Westport, Connecticut, Rev. editor 1973. 105p.

Descriptors: *Oil spills, *Water pollution control, Oily water, Oil pollution, Water pollution treatment, Planning.

A manual of common facts and procedures is presented for use by the oil spill control technician, as a guide to planning ahead for and recovering oil spills. This manual is directed at everyday spills which occur as the result of the day to day handling of petroleum products and chemicals. These are the spills that can be planned for in advance. (Knapp-USGS)
W74-10621

REGIONAL LANDFILL AND CONSTRUCTION MATERIAL NEEDS IN TERMS OF DREDGED MATERIAL CHARACTERISTICS AND AVAILABILITY: VOLUME I: MAIN TEXT; VOLUME II: APPENDIXES,
Green Associates, Inc., Towson, Md.
R. Reikenis, V. Elias, and E. F. Drabkowski.
Army Engineer Waterways Experiment Station Dredged Material Research Program Contract Report D-74-2, May 1974. 526 p, (Vol I-268 p; vol II-258p). 7 fig, 8 plate, 7 tab, 138 ref. Army Contract DACW 39-73-C-0141.

Descriptors: *Landfills, *Dredging, *Construction materials, *Sands, *Earth materials, Spoil banks, Surveys.

A survey was made of the regional needs for landfill and construction material which might be satisfied by using dredging spoils. Such needs vary substantially due to population shifts and economic growth of specific regions. Generally regional needs are substantially in excess of available volumes of dredged material, particularly in low-lying coastal areas. There are problems to overcome before dredged material is accepted for such usage. Given the projected quantities of dredged material, there can be large-scale disposal of dredged material on land sites. If these projects are planned and executed on a fixed time scale with well-integrated Government and private sector planning, desirable solutions to the dredged material disposal problem can be achieved. A detailed inventory should be made of all identified future development projects with regional development maps that show anticipated long-range needs of fill materials. Methodologies are needed for selection and acceptance of sites for disposal and stockpiling of dredged material. Techniques should be developed for placing, control, and dewatering of fine-grained hydraulic fill material to decrease time of consolidation. The most economical application of present techniques for disposal of dredged material and development of new techniques should be studied. (Knapp-USGS)
W74-10624

PRACTICES AND PROBLEMS IN THE CONFINEMENT OF DREDGED MATERIAL IN CORPS OF ENGINEERS PROJECTS,
Army Engineer Waterways Experiment Station, Vicksburg, Miss. Soils and Pavements Lab.
For primary bibliographic entry see Field 5E.
W74-10665

SEA WATER SYSTEM FOR AQUACULTURE OF ESTUARINE ORGANISMS AT THE SKIDAWAY INSTITUTE OF OCEANOGRAPHY,
Skidaway Inst. of Oceanography, Savannah, Ga.
For primary bibliographic entry see Field 5D.
W74-10670

FIDELITY OF INFORMATION TRANSMISSION IN LOCAL CAMPAIGNS ON WATER ISSUES,
Illinois Univ., Urbana. Dept. of Agricultural Economics and Sociology.
For primary bibliographic entry see Field 6B.
W74-10690

EVALUATION OF PROTOTYPE CRUSHED LIMESTONE BARRIERS FOR THE NEUTRALIZATION OF ACIDIC STREAMS,
Pennsylvania State Univ., University Park. Dept. of Civil Engineering.
F. H. Pearson, and A. J. McDonnell.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-234 551, $4.50 in paper copy, $2.25 in microfiche. Pennsylvania Institute For Research on Land and Water Resources, University Park, Research Publication No. 80, June 1974. 101 p, 24 fig, 25 tab, 33 ref, 6 append. OWRR A-030-PA(2). 14-31-0001-3838.

Descriptors: *Limestones, *Barriers, *Acidic water, *Mine drainage, Mathematical model, Hydraulics, Clays, Ions, Aluminum, Iron, Water quality, *Neutralization, *Hydrogen ion concentration, Kinetics, Chemical reactions, Design, Forecasting, *Waste water treatment, Water quality control.

At four prototype limestone barriers that had been constructed to neutralize acidic streams, water samples were taken for analysis, and measurements were made to determine the effect of each installation on water quality. The pH of stream water was increased by up to 3 pH units at low streamflow, to pH 7 or above. This demonstrates that limestone barriers are capable of renovating acidic streams to the point that normal aquatic life can be restored, rendering the stream water suitable for a number of uses that are otherwise precluded. A mathematical model of limestone barriers was constructed, based on hydraulic laws and on the chemical kinetics of the rate-limiting reactions between crushed limestone and acidic water. Model predictions matched the observed performance of the barriers, after some parameters of field conditions had been evaluated from field data. The most significant parameter describes the effect on the reactivity of limestone of the coating of clay, or of hydroxides of iron and aluminum from mine drainage, that form on limestone in streams. A simple design procedure was developed to rapidly determine the quantity of crushed limestone required to neutralize a given streamflow to any required degree, the rate of consumption of limestone in the acidic water, and the conditions for avoiding either washout of the barrier in floods, or clogging of the limestone by sediment. (See also W74-10694)
W74-10693

NEUTRALIZATION OF ACIDIC WASTES BY CRUSHED LIMESTONE,
Pennsylvania State Univ., University Park. Dept. of Civil Engineering.
F. H. Pearson, and A. J. McDonnell.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-234 549, $5.00 in paper copy, $2.25 in microfiche. Pennsylvania Institute for Research on Land and Water Resources, University Park, Research Publication No. 79, June 1974. 157 p, 48 fig, 30 tab, 27 ref, 10 append. OWRR A-030-PA(1). 14-31-0001-3838.

Descriptors: *Limestones, *Acidic water, *Neutralization, *Alkalinity, Acidity, Calcium carbonate, Carbon dioxide, Temperature, Turbulence, *Hydrogen ion concentration, Kinetics, Chemical reactions, *Waste water treatment, Water quality control.
Identifiers: Exsolution, Ionic strength, Hydrogen ions, Crushed limestone.

Experiments conducted to determine the reactivity of crushed limestone in acidic water were designed primarily to simulate the neutralization of acidic streams by barriers of crushed limestone, although the results obtained appear to be more widely applicable. Acidified water, at pH values ranging from 2 to 7, was circulated over crushed limestone in the size range 2-1/2 to 4 inches. Water samples were withdrawn periodically for determination of alkalinity and acidity, from which the kinetics of the two slower chemical reactions that

limit the overall process could be determined. These are the reaction between hydrogen ions and solid calcium carbonate, and the exsolution of carbon dioxide. For each of these reactions the dependence of the rate constant on temperature, ionic strength, and water turbulence was established; also the reaction between hydrogen ions and calcium carbonate appeared to be catalyzed by bicarbonate. Two linked differential equations were derived, that govern the decrease in the concentration of hydrogen ions and the balance of carbonic species as neutralization proceeds. These equations were solved simultaneously to obtain a description of the neutralization process, that reproduced experimental results. The pH of water in contact with crushed limestone is controlled by the reaction between hydrogen ions and limestone while mineral acidity is present, but the exsolution of carbon dioxide becomes increasingly significant where the pH is above about 5. (See also W74-10693)
W74-10694

PRACTICES IN DETENTION OF URBAN STORMWATER RUNOFF,
Poertner (Herbert G.), Bolingbrook, Ill.
For primary bibliographic entry see Field 4A.
W74-10696

THERMAL POLLUTION--A GROWING CONCERN,
Michigan Dept. of Natural Resources, Lansing.
C. D. Harris.
Michigan Natural Resources, p 20-25, May/June, 1969. 2 illus.

Descriptors: *Thermal pollution, *Nuclear powerplants, *Regulation, *Water policy, *Michigan, Water pollution, Water pollution sources, Water temperature, Great Lakes, Water cooling, Electric power production, Aquatic environment, Water law, Bodies of water, Governments, Water quality control, Heated water, Water quality standards.
Identifiers: Administrative regulations.

While nuclear power generating plants may well be the answer to man's rapidly growing demand for electric power, this solution creates problems of its own. 'Thermal pollution' is one of these problems. All nuclear plants now operating or being developed in the U.S. will be located on natural bodies of water and will use these waters for cooling. There presently are many uncertainties regarding the effect of returning the heated water to its source. Conservationists point out that radical biological changes result from even small variations in the average temperature of lakes or streams. Returning the heated water to the lake or stream may have a detrimental effect upon the fish and other aquatic life present there. To protect against possible adverse effects of thermal discharge, there should be close governmental supervision of all nuclear power plants. If these effects prove significantly harmful, the government should require the plants to shut down or turn to alternate methods of cooling, such as cooling towers or large man-made lakes. (Deckert-Florida)
W74-10698

FRENCH LAW AND THE POLICY TOWARD POLLUTION IN THE MEDITERRANEAN,
For primary bibliographic entry see Field 6E.
W74-10700

THE JAPANESE LEGAL APPROACH TO MARINE POLLUTION,
For primary bibliographic entry see Field 6E.
W74-10702

THE NEW LAW ON OCEAN DUMPING, STATUTE AND TREATY,
R. J. McManus.
Oceans, Vol 6, p 25-33, September/October, 1973.

Descriptors: *Legislation, *Treaties, *International law, *Oceans, *Waste disposal, Rivers, Water pollution sources, Water conservation, Economic aspects, Political aspects, Environmental sanitation, Ecology, Water pollution control, Regulation, United States, Monitoring, Ships, Oily wastes, Pollutants, Wastes, Water quality, International waters.
Identifiers: *Administrative regulations, Hazardous substances(Pollution).

The enactment of the Federal Marine Protection Research and Sanctuaries Act of 1972, and the enactment of the Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter are discussed. The United States has hoped that other countries would establish environmental protection regulations, but if they do not, foreign industry may gain a competitive edge since the price of their products will not reflect the cost of pollution abatement. Once the enactment of domestic ocean dumping legislation was foreseen, the United States became instrumental in establishing an international control mechanism. Neither the Act nor the treaty deal with operating discharges of ships, but with deliberate disposals at sea. Neither will affect the placing of scientific or defense monitoring devices nor will they affect the sinking of ships for fish habitats. The Act and treaty may be of little consequence as it has been estimated that ninety percent of the pollutants in the ocean get there via polluted rivers or fallout and while much of the remaining ten percent is oil, only a minuscule proportion comes from ocean dumping. (Sperling-Florida)
W74-10707

AMENDMENT OF THE OIL POLLUTION ACT, 1961, (15 STAT. 402), (FINAL ENVIRONMENTAL IMPACT STATEMENT).
Coast Guard, Washington, D.C.
Available from National Technical Information Service, Springfield, Va 22161 as EIS-AA-73-0703-F, $4.50 in paper copy. April 1973. 63 p, 3 fig, 5 tab.

Descriptors: *Oil pollution, *Pollution abatement, *Environmental effects, *Oil spills, Penalties(Legal), Navigable waters, Legislation, Oil, Water, Oil wastes, Oil pollution, Water pollution control, Water pollution effects, Oceans, Sea water, Navigation, Banks, Water pollution sources, Storage tanks, Federal government, International law, Treaties, Coast Guard regulations, Legal aspects, Water law, Pollutants.
Identifiers: Environmental Impact Statements.

The Amendment to the Oil Pollution Act of 1961 incorporated the 1969 and 1971 Amendments to the International Convention for the Prevention of the Pollution of the Sea by Oil. Provisions of the 1961 Act, which forbids oily discharges by certain large vessels within prohibited zones, are compared to the amendment, which prohibits oily discharges anywhere unless delineated conditions are met. The amendment also provides for stronger penalties and oil record book requirements. The probable impact of the amendment is described. The principal sources of oil pollution, tank cleaning operations, vessel casualties, discharge from bilge pumping, and spills during cargo handling are discussed. In order to meet total discharge limitations and instantaneous rate of discharge limitations set by the amendment, vessels will need to retain dirty ballast and tank washings which will create a demand for oily residue reception facilities, convert to a 'load on top' system, or segregate ballasts. The latter requirement will require an increase in voyages or the number of vessels needed to carry a given quantity. The amendment will increase the cost of shipping, but is the most viable alternative for preventing the adverse effects of oil pollution. (Hunter-Florida)
W74-10708

THE NATIONAL WATER PERMIT PROGRAM.
Environmental Protection Agency, Washington, D.C. Office of Enforcement and General Counsel.
June 1, 1973. 28 p.

Descriptors: *Water quality control, *Federal Water Pollution Control Act, *Permits, *Water pollution control, *Legislation, Water quality, Water pollution, Effluents, Federal government, Administrative agencies, Legal aspects, Regulation, Water pollution treatment, Water pollution sources, Wildlife conservation, Fish conservation, Pollution abatement, Rivers and Harbors Act, Water quality standards.
Identifiers: FWPCA Amendments of 1972, Environmental Protection Agency(EPA).

One major feature of the sweeping Federal Water Pollution Control Act Amendments of 1972 was the establishment of a new national permit system. The Environmental Protection Agency (EPA) has published this summary of the main features of the permit system in order to inform the public. Included are the principal aspects of the statute itself, important regulations and guidelines which have been promulgated or are being developed, and major policy directives issued by the EPA. The background of the program is described, including relationships to the Refuse Act Permit Program, and other factual information concerning the scope of the program and the manner of its implementation is included. The Administrator of EPA will issue permits in early phases of the program until states apply for and receive either interim authorization or approval of their permit programs. Generally, by 1977, permits are to be issued with effluent limitations which represent the application of the best practicable control technology currently available. By 1983, effluent requirements must be met which represent the best available technology economically achievable. Publicly owned treatment works are given more lenient standards. In addition to best technology standards, water quality standards must also be met. (Hunter-Florida)
W74-10709

WATER QUALITY AND OUR FUTURE ENVIRONMENT -- A FEDERATION VIEW,
Duncan, Lagnese, and Associates, Inc., Pittsburgh, Pa.
J. F. Lagnese, Jr., and B. G. Rogers.
Journal Water Pollution Control Federation, Vol 45, No 1, p 4-9, January, 1973.

Descriptors: *Governmental interrelations, *Government finance, *Resource allocation, *Facilities, *Decision making, Water quality control, Manpower, Research and development, Funding, Resources, State governments, Comprehensive planning, Future planning(Projected), Administration, Administrative decisions, Economics, Education, Leadership, Operations research, Political aspects, Social aspects, Public benefits, Federal government, United States.

In considering water quality for the future, factors significantly affecting the administrative and legislative evolution of water management must be identified and analyzed. Four factors are of prime importance: public influence, federal legislative processes, the operation and construction of facilities, and basic research. Public influence up to the present has amounted to pressures by competing interest groups. Any assessment must balance the conflicting demands of the groups for jobs, allocation of funds for other programs, and all the other interests which compete with water management for governmental consideration. The process of federal legislation and the need for federal-state cooperation must also be considered. A policy change should be made to make water management a national rather than a purely federal goal. The federal government must maintain leadership through legislation, but should encourage state participation. Finally, the current interest in constructing new water purification facilities must not

be allowed to overshadow the importance of basic research and development of more efficient operation of existing facilities. In general, the future of water management will require greater political sophistication as well as increasing technical expertise. (Salley-Florida)
W74-10710

URBAN CREEKS, A CONDITION OF CRISIS.
Nine-Mile Creek Citizens Committee, Saint Paul, Minn.
The Minnesota Volunteer, p 1-6, March-April, 1971. 4 illus.

Descriptors: *Watershed management, *Land development, *Flood plain zoning, *Urbanization, *Urban hydrology, Watershed(Basins), Cities, Land use, Water resources development, Governmental interrelations, Regulation, Water policy, Small watersheds, Regional development, *Minnesota, Great Plains, Regional analysis, Comprehensive planning, Degradation(Stream), Political aspects.
Identifiers: Urban creeks.

Urban creeks, like the Nine Mile Creek which runs through Edina and Bloomington, Minnesota, illustrate some of the problems created by the rapid and uncontrolled urbanization of a watershed. There are two major obstacles to controlling the development of a watershed. First, many watersheds span several independent governmental units. Second, there is tremendous economic and political pressure opposing efforts to restrain growth. Any changes to this system to safeguard the urban creeks would require a governmental structure which is accessible to the citizens and which clearly delineates authority and political responsibility. Planning must be implemented consistently from one community to another. Communication must be open between agencies to promote inter-agency cooperation. A plan for state and federal action is presented that urges the use of construction moratoriums, government acquisition of integral parts of the creeks, and strict control of development in other parts of the watershed, to save the urban creeks. (Deckert-Florida)
W74-10711

IT'S EVERYBODY LAKE,
Michigan Dept. of Natural Resources, Lansing.
R. McKee.
Michigan Natural Resources, p 22-25, November/December 1969. 3 illus.

Descriptors: *Lake Superior, *Mine wastes, *Water pollution sources, *Suspended solids, *Pollution abatement, Pollutant identification, Interstate, Water quality standards, Surface waters, Water policy, Water management, Mine water, Waste water, Toxicity, Chromium, Copper, Zinc, Sewage disposal, Fish conservation, Michigan, Pollution treatment, Adoption of practices, Administration.
Identifiers: *Federal-state cooperation.

The threat posed to Lake Superior by mining operations and refuse is considered by a joint state-federal conference implementing the Clean Waters Act. Mine tailings are predominantly sand and unrecoverable iron, but there are traces of many other metals. The mine representative points out that one major complaint of shoreline residents, a condition known as 'green water,' existed before the mining operation began. 'Green water' results from the diffusion of light by fine particles suspended in the water column. Beyond the particulate matter, drainage from tailings into the Lake poses severe problems by raising the amount of minerals, such as copper, zinc, and chromium. These elements are toxic to aquatic life under certain conditions. The risks to the Lake are unnecessary. A joint state-federal conference has been arranged which has appointed a technical committee to study the water quality of the Lake and offer recommendations to maintain it, and has requested mine officials to undertake engineering studies to determine ways and means of reducing their discharges into the Lake. In addition each of the three states bordering the Lake is to establish new municipal sewage control programs. (Salley-Florida)
W74-10712

REPORT TO THE CONGRESS--WATER POLLUTION ABATEMENT PROGRAM: ASSESSMENT OF FEDERAL AND STATE ENFORCEMENT EFFORTS, ENVIRONMENTAL PROTECTION AGENCY.
Comptroller General of the United States, Washington, D.C.
For primary bibliographic entry see Field 6E.
W74-10715

POLLUTION CONTROL IN ILLINOIS, THE FORMATIVE YEARS,
Illinois Pollution Control Board, Springfield.
S. N. Klein.
De Paul Law Review, Vol 22, p 759-778, 1972-73. 80 ref.

Descriptors: *Illinois, *Legislation, *Water pollution control, *Water quality standards, *Effluents, *State governments, Legal aspects, Regulation, Water pollution, Water policy, Waste water treatment, Sewage treatment, Sewage effluents, Discharge(Water), Administrative agencies, Administration, Pollution abatement, Water quality, Planning, Environment, Environmental effects.

Several key provisions of the Illinois Environmental Protection Act of 1970, some fundamental principles and precedents established by the Illinois Pollution Control Board, and the major problem areas which have confronted that agency in its formative years are examined. The Act turned a haphazard program to protect the environment into an innovative, effective program covering all aspects of pollution control. Three different agencies were established, each will authority over the entire field of pollution control. In the field of water pollution, the Pollution Control Board established a comprehensive, two-pronged regulatory program. The water quality standards are designed to protect entire streams and bodies of water, and the effluent standards cover a wide range of chemical constituents and are designed to force dischargers to capture harmful contaminants at the point of discharge. The combined effluent and water quality standards cover all discharges into Illinois waterways and provide a uniform, comprehensive and coherent statewide water pollution control plan. Other Illinois pollution problems and how the agencies deal with them are described. (Craig-Florida)
W74-10718

OILY BALLAST DISCHARGE - PROPOSED REQUIREMENTS.
Coast Guard, Washington, D.C.
For primary bibliographic entry see Field 6E.
W74-10719

CONSENT JUDGEMENTS IN ACTIONS TO ENJOIN DISCHARGES OF POLLUTANTS.
Department of Justice, Washington, D.C.
For primary bibliographic entry see Field 6E.
W74-10720

MARITIME POLLUTION: THE CANADA SHIPPING ACT AMENDED.
University of British Columbia Law Review, Vol 8, No 1, p 197-204, 1973. 39 ref.

Descriptors: *Legislation, *International law, *Canada, *Legal aspects, *Water pollution sources, *Boats, Navigation, Economic aspects, Environmental sanitation, Water pollution control, Water law, Political aspects, Public health, Cost allocation, Water pollution, Water conservation, Coasts, Shorelines, Admiralty, Ecology, Environmental effects.
Identifiers: Coastal waters, Hazardous substances(Pollution).

Canada has adopted legislation to govern and control the threat of marine pollution, particularly in coastal waters. This legislation, the Canada Shipping Act, was intended to provide measures whereby pollution would be prevented as well as to insure adequate remedies for compensation, however it may have little application to the majority of pollution incidents which occur on the coasts. Amendments to the Act made polluters civilly liable for pollution damage both to the government and to private interests. The Act imposes liability on the shipowner and the owner of the pollutant, regardless of fault. There are three exceptions to this general liability. If the pollutant was discharged by an act of war or of God, the intentional act of an independent third party, or due to negligence in the operation or maintenance of aids to navigation, liability will not attach. The ship or cargo owners may seek indemnity from third parties. There is strict, though limited liability, for the shipowner in a pollution incident attributable to his vessel. (Sperling-Florida)
W74-10721

LOCAL INITIATIVE IN POLLUTION CONTROL,
Environmental Protection Agency, Washington, D.C.
W. D. Ruckelshaus.
Journal of the Water Pollution Control Federation, Vol 45, No 1, p 1-3, January 1973.

Descriptors: *Governmental interrelations, *State governments, *Local governments, *Water pollution control, *Pollution abatement, *Federal Water Pollution Control Act, Water quality control, Water quality, Projects, Federal project policy, Cost repayment, Grants, Financing, Interstate, Decision-making, Administration, Permits.

State participation in pollution control and state co-operation with federal pollution control efforts are needed badly. Proposed is the establishment of a working group of state elected representatives, one from each of the Environmental Protection Agency's (EPA) 10 regions, to work with EPA in devising an effective way in which to clean up the nation. The members of this group would be officials responsible for implementing state programs and inserting state viewpoints at the early stages of EPA decision making. One of the prime objectives of the proposed program would be to strengthen state environmental programs largely through federal grants to state and interstate agencies. Another objective is to provide federal-state teamwork in evaluation the thousands of individual plants across the nation in light of EPA permit guidelines for determining best practicable control technology. The program would also eliminate duplicated efforts in state permit programs and federal permit programs. Several states are sharing with their EPA regional headquarters the responsibility for certification of review of federally assisted projects; this practice, which reduces processing time, is encouraged. (Hunter-Florida)
W74-10722

A BILL TO PROMOTE COMMERCE AND PROTECT THE ENVIRONMENT BY ESTABLISHING PROCEDURES FOR THE SITING, CONSTRUCTION, AND OPERATION OF DEEP-WATER PORT FACILITIES OFF THE COAST OF THE UNITED STATES, AND FOR OTHER PURPOSES.
For primary bibliographic entry see Field 6E.
W74-10723

ANALYSIS OF POLLUTANTS - PROPOSED TEST PROCEDURES.
Environmental Protection Agency, Washington, D.C.
For primary bibliographic entry see Field 5A.
W74-10725

THAT WASTE DISPOSAL PROBLEM,
Minnesota Univ., Minneapolis. Agriculture Extension Service.
For primary bibliographic entry see Field 5D.
W74-10726

UNITED STATES V. BOYD (PROSECUTION OF SHIP CAPTAIN FOR FAILURE TO REPORT OIL DISCHARGE).
For primary bibliographic entry see Field 6E.
W74-10727

STATE V. MCFARREN (ACTION TO REQUIRE LANDOWNER TO REMOVE FILL DEPOSITED IN A NAVIGABLE LAKE).
For primary bibliographic entry see Field 6E.
W74-10728

DESCRIPTION OF STATE OF GEORGIA'S PROPOSED NPDES PROGRAM.
Manuscript, 1974. 24 p, 3 tab, 2 fig.

Descriptors: *Georgia, *State governments, *Administrative agencies, *Adoption of practices, *Coordination, Decision making, Legislation, Personnel management, Planning, Water management(Applied), Permits, Administrative decisions, Manpower, Training, Employees, Engineering personnel, Professional personnel, Operations research, Water law, Water policy.

The program by which the state of Georgia will carry out the National Pollutant Discharge Elimination System (NPDES) is discussed. An Environmental Protection Division is to be created by the state legislature and will be composed of six sub-agencies: the Industrial Waste Service, the Municipal Engineering Service, the Private and Institutional Development Service, the Training and Grants Service, the Water Quality Service, and the Laboratory Services Unit. The membership of the agencies, funding, and manpower requirements are delineated as well as the training or experience levels required for each position. Procedures are set out for reporting and for public notice to allow participation by the public in hearings on controversial issues. Flow charts diagram the process from application for a permit, through the hearing stage, and to a decision and appeal. The mechanics and framework of the Georgia NPDES agency are described. (Salley-Florida)
W74-10731

MARINE RESOURCES -- A NATIONAL PERSPECTIVE,
National Oceanic and Atmospheric Administration, Washington, D.C. Office of Coastal Environment.
For primary bibliographic entry see Field 6E.
W74-10732

PLAYING TO WIN IN THE DRAINAGE GAME,
For primary bibliographic entry see Field 6E.
W74-10733

A GAME PLAN FOR WATER RESOURCES,
Minnesota Dept. of Natural Resources, Saint Paul.
For primary bibliographic entry see Field 6E.
W74-10734

(DEATH OF A POND. DEATH OF A RIVER. THE SOUND AND FURY).
The Minnesota Volunteer, p 38-47, July-August, 1971. 7 illus.

Descriptors: *Wetlands, *Environmental effects, *Drainage, *Drainage effects, *Administrative agencies, Drainage programs, Ditches, Flood plains, Ecology, Soil conservation, Channeling, Water policy, Water management(Applied), Water conservation, Land management, Erosion, River flow, River systems, Silting, Floods, Wildlife conservation, State governments, State jurisdiction, Federal government, Conservation, Adoption of practices, aquifers.
Identifiers: *Administrative regulations, *Channelization.

There are extensive programs in the U.S. to drain wetlands by channelling rivers and streams, by constructing drainage ditch systems and by clearing trees on flood plains. These practices reduce the capacity of a region or watershed to hold and store water. Dumping water downstream creates a chain reaction: floods, siltation from accelerated run-off, erosion, loss of aesthetic value, and destruction of fisheries, wildlife and other natural resources. Controversy rages between the Soil Conservation Service (SCS) and Corps of Engineers who implement these drainage programs, and the conservation agencies in many states. The public has been little concerned with the impact of drainage and channelization because drainage of vast acreage is not readily visible to the general public, the media has concentrated on more dramatic ecological disasters such as oil spills and air pollution, agricultural interests predominate over conservation interests in decision-making, and rival government agencies are reluctant to criticize SCS and the Corps. (Dillingham-Florida)
W74-10735

ECONOMIC IMPLICATIONS OF WATER POLLUTION ABATEMENT IN FAMILY FARM LIVESTOCK PRODUCTION,
Economic Research Service, Urbana, Ill. Farm Production Economics Div.
For primary bibliographic entry see Field 6E.
W74-10738

TEST OF A NEW MODEL FOR THE KINETICS OF ADSORPTION-DESORPTION PROCESSES,
Utah State Univ., Logan. Dept. of Soils and Biometeorology.
R. A. Griffin, and J. J. Jurinak.
Soil Science Society of America Proceedings, Vol 37, No 6, p 869-872, November-December, 1973. 5 fig, 1 tab, 8 ref.

Descriptors: *Nutrient removal, *Phosphates, *Adsorption, Thermodynamics, Mathematical models, Computer models, *Kinetics.
Identifiers: *Desorption.

A new model for the kinetics of adsorption-desorption processes proposed by Lindstrom, Haque, and Coshow (1970) was tested with adsorption and desorption data for the interaction of phosphate with the calcite mineral surface. The model was found to offer considerable advantages in speed and convenience to those users whose experimental conditions correspond to the assumptions inherent in the derivation of the model. There was reasonable agreement between the predicted adsorption kinetic parameters and experimental data. However, considerable disparity was observed between predicted and experimental desorption parameters. It was concluded that the model was not valid for endothermic processes. (Skogerboe-Colorado State)
W74-10742

SOIL AND WATER CONSERVATION RESEARCH: CHALLENGE FOR THE 70'S,
Agricultural Research Service, Beltsville, Md. Soil and Water Conservation Research Div.
For primary bibliographic entry see Field 3F.
W74-10750

PROCEEDINGS OF MEETING ON ENVIRONMENTAL POLLUTION (3RD) HELD AT FORT MCNAIR ON 17-18 MAY 1972, SPONSORED BY AMERICAN ORDNANCE ASSOCIATION.
Edgewood Arsenal, Aberdeen Proving Ground, Md.
Available from the National Technical Information Service, Springfield, Va 22161 as AD-766 718 $5.50 in paper copy; $2.25 in microfiche. Report EASP 1300-3, August 1973. 231 p, 60 fig, 23 tab, 5 ref.

Descriptors: *Pollution abatement, *Air pollution, *Water pollution, *Military aspects, Jurisdiction, Wastes, International law, Ships, Oil spills, Aircraft hazards, Economics, Detergents, Land management, Herbicides, Pesticides, Fish, Wildlife, Recycling, Monitoring, Fuels, Sewage disposal, Garbage dumps, Coast Guard regulations, Estuaries, Legislation, Food chains, Design, Research and development, Pollutants, Delaware River, Illinois, Political aspects, Powerplants, Cooling towers, Sites.
Identifiers: *American Ordnance Association, Noise pollution, Navy, Air Force, Army, Environmental Protection Agency.

The environmental pollution problems, including air pollution, water pollution, and noise pollution, are discussed by representatives of the Army, Navy, Maritime Administration, and Coast Guard. The session dealt with pollution in the marine environment, pollution from domestic and industrial wastes, and pollution from power generation. Each agency has its specific problems and the specific nature of each environment requires special treatment. Oil spills, hazardous material spills, vessel protection, and ocean dumping are emphasized. Regionalization of megalopoli enhances pollution control as exemplified by the Delaware River Estuary. The Refuse Act Permit Program is described in connection with discharges to navigable waters without a permit from the Corps of Engineers. The regional Air Pollution Study, a five-year program of air pollution research, is elucidated. Special studies were made in St. Louis of regional air pollution control and of Chicago for waste water management. The power industry was discussed in connection with the Environmental Protection Agency's research and development program, the growth in power demand, the relation of water requirements for cooling and the significance of plant location, design, and operation. (See W74-10766 thru W74-10783) (Jones-Wisconsin)
W74-10765

THE MILITARY ATTACKS POLLUTION,
Office of the Deputy Assistant Secretary for Defense for Environmental Quality, Washington, D.C.
J. A. Busterud.
In: American Ordnance Association Proceedings of 3rd Meeting on Environmental Pollution, May 17-18, 1972, Fort McNair, Washington, D.C., p 17-21, 1973.

Descriptors: *Pollution abatement, *Water pollution control, *Air pollution, *Military aspects, Environment, Legislation, Jurisdication, Foreign countries, Conservation, Costs, Research and development, Hazards.
Identifiers: *Department of Defense, Army, Navy, Air Force.

The Department of Defense has the responsibility for providing leadership in developing techniques for identifying possible environmental imapcts in early planning stages and including environmental consideration into planning phases. An important role is supervision of the massive cleanup operation required by federal and state water, air, and solid-waste statutes and regulations. The DoF controls some 29,000,000 acres of real estate with a heavy responsibility for carrying out its stewardship sensitive to the preservation of natural resources. The DoF cooperates in providing

leadership to the international community in environmental fields. Identification of environmental pollution and coordination of research activities in connection with these problems is involved. Army pollution abatement programs are directed toward vehicle and mobile sources and Army aircraft, biomedical effects of noise and electromagnetic radiation, air, water, and solid-waste disposal, and construction and facility operations. Navy programs encompass ship pollution abatement, oil spills, and controls aircraft pollution, ordnance disposal, and development of a data base. The major programs of the Air Force are in aircraft and missile emissions and control, noise and sonic boom effects, electromagnetic effects, ground facility support, hazardous material handling, and evaluation and control of noxious effluents in the atmosphere. (See also W74-10765) (Jones-Wisconsin)
W74-10766

THE ARMY, ITS MILITARY ACTIVITIES, AND THE ENVIRONMENT DURING 1970,
Deputy Chief of Staff for Logistics (Army), Washington, D.C.
R. E. McConnell.
In: American Ordnance Association Proceedings of 3rd Meeting on Environmental Pollution, May 17-18, 1972, Fort McNair, Washington, D.C., p 23-61, 1973. 1 fig, 10 tab.

Descriptors: *Pollution abatement, *Military aspects, *Environment, *Planning, Ecology, Population, Economics, Air pollution, Water pollution, Ships, Oil, Detergents, Land management, Herbicides, Pesticides, Forest management, Fish management, Wildlife management, Solid wastes, Industrial wastes, Recycling, Sewage treatment, Monitoring, Operations, Fossil fuels, Construction equipment, Aircraft, Facilities, Radiation.
Identifiers: *Army, *Environatics, Noise pollution, Automotive equipment.

Environmental problems of Army installations can generally be treated in the same fashion as those in civilian areas. Army fiscal planning includes provisions for many projects relating to protection and enhancement of environmental quality. The Army will comply fully with both the requirement and the spirit of Executive Orders relative to prevention, control, and abatement of air and water pollution at federal facilities. Details of Army programs in environatics include discussion of air pollution (installations, automotive vehicles, ships, aircraft, construction equipment, materials-handling equipment, specifications for paints, varnishes and other volatile substances, unleaded gasoline); water pollution (installations, ships, oil, purchase of detergents); land management, conservation, herbicides and pesticides (general program and soil and water conservation, forest management program, fish and wildlife management program, post/camps/station operations); noise pollution (specific research and development work); thermal pollution; radiation pollution, solid waste (nonindustrial and industrial activities, recycling); toxic and hazardous materials; research and development activities and requirements; training programs; enhancement of the environment; and public information. These abatement programs, and more, are detailed as the Army's contribution to environmental pollution abatement. (See also W74-10765) (Jones-Wisconsin)
W74-10767

ENVIRONMENTAL LEGISLATION AND THE AIR FORCE,
Environmental Protection Agency, Washington, D.C.
C. M. Whitehead.
In: American Ordnance Association Proceedings of 3rd Meeting on Environmental Pollution, May 17-18, 1972, Fort McNair, Washington, D.C., p 63-65, 1973.

Descriptors: *Pollution abatement, *Military aspects, Facilities, Aircraft, Waste treatment, Air pollution, Fuels, Land use.
Identifiers: *Air Force, Noise abatement.

The Air Force will have spent almost $80 million for new facilities to combat water pollution at its installations in addition to approximately $160 million in facilities already in place. The work has involved upgrading and expansion of plant facilities for treating sanitary and industrial liquid wastes and related improvement to collection systems. The air pollution abatement program will amount to about $60 million in additional facilities construction, the major portion going into the conversion of heating plants from solid fuel to liquid and gaseous fuels. All Air Force actions are subjected to environmental assessment and are reviewed by the Command Environmental Protection Committees. The major aircraft emission problems are carbon monoxide and hydrocarbons at low power and nitrogen oxides and smoke at high power. Technology is or will be available in the near future to reduce smoke, carbon monoxide, and hydrocarbons. However, nitrogen oxide control is more difficult because the trend of engine development (compressor ratio, turbine inlet temperature) is in the direction of aggravating the problem. To address the runup problem the Air Force has spent about $25 million to procure and install sound suppressors. (See also W74-10765) (Jones-Wisconsin)
W74-10768

NAVAL ENVIRONMENTAL PROTECTION PROGRAM,
Office of the Chief of Naval Operations, Washington, D.C. Environmental Protection Div.
J. A. D'Emidio.
In: American Ordnance Association Proceedings of 3rd Meeting on Environmental Pollution, May 17-18, 1972, Fort McNair, Washington, D.C., p 66-83, 1973. 7 fig.

Descriptors: *Pollution abatement, Facilities, Harbors, Military aspects, Smoke, Air pollution, Solid wastes, Waste treatment, Oil spills, Waste disposal, Environment.
Identifiers: *U.S. Navy.

Fuels are subject to stringent particulate and sulfur oxide emission standards developed by local, state or federal agencies. Each year the Navy's pollution-abatement program proposal for the congressional budgets are reviewed by the Environmental Protection Agency to insure compliance with the 'standards' and to ascertain cooperation with state and local programs. The Navy's effort has been concentrated mainly in the two areas where the impact of pollution abatement is the greatest--shore facilities and ships. Though significantly less in magnitude, programs to control engine emissions from both vehicles and aircraft are also being vigorously pursued. One major effort presently underway is the reduction of smoke from ships' boilers. Naval Ships Systems Command is developing compactors, encapsulators, and incinerators for use aboard ships so that solid waste management can be practiced. Pernicious small spills in harbors caused by leaks, overflows through vent pipes on ships, parting of fuel lines during oil transfer and recovering operations, and human error are attacked by several measures. Deepwater dumping of ordnance has been stopped. (See also W74-10765) (Jones-Wisconsin)
W74-10769

MARITIME ADMINISTRATION POLLUTION ABATEMENT PROGRAM,
Maritime Administration, Washington, D.C., Office of Ship Construction.
E. S. Dillon.
In: American Ordnance Association Proceedings of 3rd Meeting on Environmental Pollution, May 17-18, 1972, Fort McNair, Washington, D.C. p 85-92, 1973. 1 fig, 1 tab.

Descriptors: *Pollution abatement, *Navigation, Industries, Ships, International law, Oil pollution, Waste disposal, Smoke, Oily water, Oceans, Harbors, Regulation, Economic efficiency.
Identifiers: *Maritime Administration, Ballast, Offshore terminals, Maritime shipping, Tankers.

While smoke, garbage, and trash disposal have their obnoxious features, they can be coped with satisfactorily in most situations. Sewage and oily waste disposal, however, are problematic. Principal efforts are directed to their solution, with the greatest allocation of personnel and funding accorded to oil pollution. Work is carried on with the U.S. industry through the National Industrial Pollution Control Council for pollution abatement, with the aid from the American Institute for Merchant Shipping. The UN Subcommittee on Marine Pollution of the Intergovernmental Maritime Consultative Organization acts as a steering group and coordinator. The requirement to build all new tinkers with sufficient ballast tankage of clean salt water to prevent large amounts of oily ballast water from entering the sea should be implemented. IMCO asked the United States to conduct a similar study for product carriers, i.e., gasoline and kerosene. To obtain scientific knowledge of the fate and effects of oil in various concentrations and amounts entering open oceans, a long-range research project is underwritten. Even after years of attention to the problem, there is still no satisfactory program or set of regulations to guide shipbuilders and shipowners on ship sewage disposal. (See also W74-10765) (Jones-Wisconsin)
W74-10770

ROLE OF COAST GUARD IN POLLUTION CONTROL,
Coast Guard, Washington, D.C. Office of Marine Environment and Systems.
W. Benkert.
In: American Ordnance Association Proceedings of 3rd Meeting on Environmental Pollution, May 17-18, 1972. Fort McNair, Washington, D.C., p 93-95, 1973.

Descriptors: *Pollution abatement, *Coast Guard regulations, Ships, Oil pollution, Waste disposal, Sewage disposal, Law enforcement, Navigable waters, Regulation, Oceans.
Identifiers: Coast Guard.

The Coast Guard has pollution abatement problems similar to the Navy's only on a slightly smaller scale in vessels and shore-side establishments. The Coast Guard is the primary law-enforcement agency dealing with oil pollution in navigable waters and is directly involved in the problem of sewage pollution as soon as the Environmental Protection Agency promulgates their standards. All oil spills are investigated and they are responsible for insuring that the person who spills the oil cleans it up. They are also responsible for prevention in that, under the act, they are required to come up with regulatory action hopefully resulting in controlling accidental or deliberate oil spills. Oil pollution-prevention regulations have been developed; some aspects of these regulations apply to vessels; some to people who operate these vessels, some to the people responsible for the vessel's operation, and probably most important, some to the terminal-ship interface. Most spills occur during transfer of cargo from shore-site ships and vice versa. The Coast Guard has been in regulatory fields particularly appropriate to the Merchant Marine and has a close association with the operation and functioning of the Merchant Marine. (See also W74-10765) (Jones-Wisconsin)
W74-10771

OIL SPILLS, HAZARDOUS MATERIALS SPILLS, VESSEL PROTECTION, AND OCEAN DUMPING,
Edison Water Quality Lab., N.J.
R. Dewling.

In: American Ordnance Association Proceedings of 3rd Meeting on Environmental Pollution, May 17-18, 1972. Fort McNair, Washington, D.C., p 99-106, 1973.

Descriptors: *Pollution abatement, *Oil spills, *Chemicals, Ships, Oceans, Inland waterways, Estuaries, Technology, Ships, Legislation, Shores, Disasters, Monitoring, Boats, Toxins, Acids, Hazards.
Identifiers: *Hazardous materials.

The program conducted by the Edison Water Quality Laboratory of the EPA in connection with oil spills, hazardous material spills, and effluent from small recreational watercraft in inland waters and estuaries is described. The techniques for identifying oil, containment, removal, and beach restoration are being evaluated. Research programs are conducted to develop greater awareness of the effects of assiduous disposal of crankcase oil, the major pollution source, and techniques for restoring the waste product for reuse, and the effects of various oil products on aquatic life. The hazardous materials (most of which are water soluble) program is concerned with prevention, monitoring, and cleanup. The variability of toxic effects of the many chemical compounds, their effect on biological life, spill reporting and development of detection techniques, are more critical than they are for oil, especially from the public safety standpoint. The problems of counter-measures in hazardous materials spills and detoxification are discussed. The laboratory's aims are also in developing technology for meeting water quality standards for small recreational watercraft effluent, the problems of discharges from holding tanks in rural areas and small marinas, and treatment systems. The prognosis for eliminating oil discharges from outboard motors is good. (See also W74-10765) (Auen-Wisconsin)
W74-10772

THE COAST GUARD MARINE ENVIRONMENTAL PROTECTION PROGRAM,
Coast Guard, Washington, D.C. Marine Environmental Protection Div.
D. B. Charter, Jr.
In: American Ordnance Association Proceedings of 3rd Meeting on Environmental Pollution, May 17-18, 1972. Fort McNair, Washington, D.C., p 107-116, 1973.

Descriptors: *Pollution abatement, *Coast Guard regulations, Law enforcement, Navigable waters, Oil pollution, Ships, Water pollution control, Hazards, Water pollution effects, Legislation, Sewage disposal, Regulation, Oil pollution, United Nations, Research and development, Environmental effects.
Identifiers: *Coast Guard.

The Coast Guard has developed a progressive Marine Environmental Protection Program to help combat pollution and maintain a clean environment. The major elements of the program, prevention, impact, response and internal abatement, are designed to utilize best multimission resources and multidisciplinary Coast Guard expertise. This effort is supported with substantial engineering and research and development efforts. Polluting spills would be minimized with minimum effect on the ecological, aesthetic, recreation, economic and health aspects of the marine environment with undue curtailment or restraint of legitimate recreational and commercial usage of waterways. The vessel prevention activities include prevention of discharges of oil, hazardous substances and other materials, and control of vessel sewage. The Coast Guard is conducting regular shoreside and waterside patrols in major port areas to detect illicit spills. The impact assessment element of the program covers environmental impact considerations, and pollution research and investigations. When a discharge occurs, it is expected and encouraged that the person responsible will carry out removal. In addition to continued development of cleanup equipment for oil spills, work will be continued in developing special systems to abate routine sewage, solid waste, and exhaust emissions from vessels. (See also W74-10765) (Jones-Wisconsin)
W74-10773

RESEARCH AND DEVELOPMENT ON PREVENTION OF POLLUTION OF THE SEAS BY OIL AND OTHER POLLUTANTS,
Maritime Administration, Washington, D.C. Office of Research and Development.
J. Seelinger.
In: American Ordnance Association Proceedings of 3rd Meeting on Environmental Pollution, May 17-18, 1972. Fort McNair, Washington, D.C., p 117-126, 1973. 5 fig.

Descriptors: *Pollution abatement, *Research and development, *Oceans, *Oil pollution, International waters, Standards, Treaties, Ships, Facilities, Operations research, Water pollution control, Cost-benefit analysis.
Identifiers: *Maritime Administration.

The concern of the Maritime Administration research and development programs is only with prevention of both accidental and intentional oil discharges. Requirements of current oil discharge laws and standards are summarized. The U.S. position at the Intergovernmental Maritime Consultative Organization conference will probably be that segregated ballast fully meets the intent of 'complete elimination,' and the discharge of oily wastes which produce a sheen, sludge or emulsion should be prohibited on both the high seas and in territorial waters in an attempt to extend domestic policy on an international agreement basis. To approach the goal of complete elimination, no one alternative can be effective. Segregated ballast, for example, will not solve or accommodate when heavy weather requires taking on more ballast than segregated capacity allows; nor, and more significantly, does it eliminate oily wastes generated during the tank-cleaning process. Research activities are directed to develop and evaluate ship equipment, systems and operating practices, ship designs and shoreside facilities to enable pollution-free ship operation with minimum economic penalty to the maritime community. (See also W74-10765) (Jones-Wisconsin)
W74-10774

REGIONALIZATION IN THE DELAWARE RIVER ESTUARY,
Delaware River Basin Commission, Trenton, N.J. Water Quality Branch.
For primary bibliographic entry see Field 5D.
W74-10775

REFUSE ACT PERMIT PROGRAM,
Environmental Protection Agency, Washington, D.C. Office of Refuse Act Programs.
R. B. Schaffer.
In: American Ordnance Association Proceedings of 3rd Meeting on Environmental Pollution May 17-18, 1972. Fort McNair, Washington, D.C., p 145-149, 1973.

Descriptors: *Permits, *Effluents, *Navigable waters, Industrial wastes, Rivers and Harbors Act, State jurisdiction, Legislation, Social participation, Municipal wastes, Waste disposal.
Identifiers: *Refuse Act, Corps of Engineers.

Authority for the Refuse Act Permit Program is derived from Section 13 of the River and Harbor Act of 1899. In simple terms, it states that no discharges are allowed to navigable waters or their tributaries without a permit from the Corps of Engineers. The procedure for obtaining a permit is described. Technical review of permit applications generally takes place at the regional level. After extensive research and coordination with experts in the various industrial fields, the regions are provided with general guidance in the conditions to be imposed on the discharger. Evaluation of the permit applications is approached on an industry-by-industry basis by gathering the best available information on the processes used by a particular industry, and on the waste abatement practices available and/or commonly used by the industry. Then, the river basin to be affected by the discharger is considered. Passage of new legislation which would cause substantial changes in the scope and procedures of the program is anticipated. (See also W74-10765) (Jones-Wisconsin)
W74-10776

THE RAPS PROGRAM,
Environmental Protection Agency, Research Triangle Park, N.C. Chemistry and Physics Lab.
For primary bibliographic entry see Field 5A.
W74-10777

REGIONAL WASTEWATER MANAGEMENT SYSTEMS FOR THE CHICAGO METROPOLITAN AREA,
Corps of Engineers, Washington, D.C.
For primary bibliographic entry see Field 5D.
W74-10778

U.S. ARMY ENVIRONMENTAL QUALITY RESEARCH AND DEVELOPMENT PROGRAMS,
Army Research Office, Arlington, Va. Life Sciences Div.
J. L. Gregg.
In: American Ordnance Association Proceedings of 3rd Meeting on Environmental Pollution May 17-18, 1972. Fort McNair, Washington, D.C., p 177-182, 1973. 7 fig.

Descriptors: *Pollution abatement, *Research and development, *Military aspects, Air pollution, Water pollution, Industrial plants, Construction, Biodegradation, Waste water treatment, Recycling, Facilities.
Identifiers: *Army, Army materiel, Emission control.

The Army's pollution problems reflect those of the civilian community although it has its own set of unique pollution problems as well. For example, there are many problems arising from the manufacture, handling, and demilitarization of munitions which have no counterpart in the civilian community. Development of military materiel requires constant assessment of the polluting potential of each item to ensure that emissions produced during testing, manufacturing, operation, maintenance, and final disposal are minimized consistent with operational requirements. There are a substantial number of problems associated with Army industrial facilities and military construction activities which must be addressed in toto by their own program. Army Materiel Command, being the industrial manager for the Army, is confronted with pollution problems as diverse as Army materiel itself. The Army's R and D effort in the area of environmental quality enhancement is comprehensive and responsive to its problems. It is sufficiently farsighted to assist the Army materially in its goal to minimize both short-term and long-term adverse environmental impacts associated with its operations. It will continue to lean upon industry and the civilian academic community for assistance in this area. (See also W74-10765) (Jones-Wisconsin)
W74-10779

AIR FORCE ENVIRONMENTAL RESEARCH AND DEVELOPMENT PROGRAM,
D. G. Silva.
In: American Ordnance Association Proceedings of 3rd Meeting on Environmental Pollution May 17-18, 1972. Fort McNair, Washington, D.C., p 183-200, 1973. 19 fig.

Descriptors: *Pollution abatement, *Research and development, Air pollution, Water pollution, Solids wastes, Aircraft, Technology, Photography, Waste water treatment, Waste disposal, Birds, Smoke, Metallurgy.
Identifiers: *Air Force, Photographic wastes, Emissions.

The research responsibility of the Air Force is currently being carried out by the Environics Branch of the Civil Engineering Research Division, divided into Air Resources, Water Resources, Solid Waste, and Ecosystems Technology Sections. A research project currently being conducted by the Air Resources Section is investigation into proper operation of jet engine test cells to prevent air pollution. Another maintenance operation found to be a potential polluter is replating operations. Another related project of the Water Resources Section is investigation of treatment methods to prevent environmental pollution from photographic development processes. Research is conducted in water and wastewater treatment facilities. An in-house evaluation is being made of a water filter of fused diatomaceous earth. The Solid Waste Section is currently investigating several Air Force problem areas, one of which is destruction of classified material including film. Air Force practices with solid waste are being investigated. Study is made of bird-aircraft strikes, and a technique to reduce the smoke emissions released during crash-rescue training fires. Another program, conducted at the laboratory, cuts across all the research disciplines--collection of Air Force pollution emission factors. (See also W74-10765) (Jones-Wisconsin)
W74-10780

THE EPA RESEARCH AND DEVELOPMENT PROGRAM FOR ENVIRONMENTAL CONTROLS IN THE POWER INDUSTRY,
Environmental Protection Agency, Washington, D.C. Industrial Pollution Control Section.
G. Rey, G. Manning, and F. Rainwater.
In: American Ordnance Association Proceedings of 3rd Meeting on Environmental Pollution, May 17-18, 1972, Fort McNair, Washington, D.C., p 203-213, 1973. 1 fig, 3 tab.

Descriptors: *Pollution abatement, *Research and development, *Electric power industry, Grants, Water pollution control, Recycling, Legislation, Water requirements, Technology, Management, Water reuse, Cooling water, Waste water treatment, Thermal pollution.
Identifiers: *Environmental Protection Agency, Demonstration projects.

The Environmental Protection Agency has developed a program for water pollution control for the power industry consisting of research, engineering and development, and demonstration. It is hoped that it will indicate areas of mutual and potential participation and cooperation by and between the federal, state, municipal, and industrial communities. The program allows for the demonstration of new technology to show decision makers that new and improved methods are available. Industry may participate in grant programs to develop and demonstrate new or improved methods of treating waste or otherwise preventing pollution and which method shall have industry-wide application. Authorized grants may not exceed 70% of the project cost, and are limited to a maximum of $1 million. It is imperative that methods for water and wastewater management be developed where necessary by the power industry in conjunction with municipalities. The cost of all water handling, and water availability are becoming vital parts of the power industry's economics thus some industries are now considering use of sewage treatment plant effluent as makeup for cooling water; others are innovating intensive programs of internal use abatement, multiple use, and recycle to attain 90-99% reduction in effluent discharges, and hence, intake volume. (See also W74-10765) (Auen-Wisconsin)
W74-10781

SOME ENVIRONMENTAL CONSIDERATIONS IN POWER GENERATION,
Burns and Roe, Inc., Oradell, N.J.
K. A. Roe.
In: American Ordnance Association Proceedings of 3rd Meeting on Environmental Pollution, May 17-18, 1972, Fort McNair, Washington, D.C., p 215-224, 1973. 5 fig, 1 tab.

Descriptors: *Environmental effects, *Thermal powerplants, *Sites, Heat transfer, Heat, Cooling, Economics, Aquiculture, Beneficial use, Agriculture, Regional analysis, Permits, Planning.

Within two decades we will have to build at least 250 huge new power generating stations across the country on sites containing at least several hundred acres. One to two billion dollars investment will be involved and will take five to eight years or more to design and construct. Among the principal factors affecting site selection are topography, subsurface conditions, site accessibility by road, rail and water, location of load centers, proximity to transmission grid, fuel supply, and cooling water supply. Currently, the most favored methods of dissipating heat from thermal power plants are once-through cooling systems, man-made cooling lakes, spray ponds and wet (evaporative) cooling towers. Dry (non-evaporative) cooling towers, salt water cooling towers and salt water ponds are under consideration primarily in areas where fresh water makeup is unavailable for evaporative cooling. More regional planning and organizations to resolve questions which cross state lines are necessary if the complex environmental and licensing issues facing the power industry are to be effectively solved and in a timely manner. These regional groups should consider beneficial use of heat, such as to support aquaculture, agriculture, and recreation. (See also W74-10765) (Jones-Wisconsin)
W74-10782

POWER PLANT SITING PROGRAM,
Maryland Dept. of Natural Resources, Annapolis.
L. E. Zeni.
In: American Ordnance Association Proceedings of 3rd Meeting on Environmental Pollution, May 17-18, 1972, Fort McNair, Washington, D.C., p 225-231, 1973.

Descriptors: *Electric powerplants, *Sites, *Legislation, *Decision making, Environmental effects, Air pollution, Nuclear powerplants, Maryland, State governments, Thermal pollution, Chesapeake Bay, Evaluation, Financing, Future planning(Projected), Monitoring.

In anticipation of a tripling of U.S. electricity consumption by 1990 and the consequent environmental effects, Maryland has enacted legislation creating a state power plant siting program which contains a number of innovative features. The electric utilities and the Maryland Public Service Commission are directed to engage in long-range planning to develop forecasts for electric demand and supply and proposed power plant sites for at least ten years. The Department of Natural Resources must prepare preliminary environmental impact statements sufficient to estimate the environmental impact of each proposed location, to be investigated in detail. To provide scientific and technical information relevant to site evaluation and decision, the state is committed to a comprehensive, multiply-funded research and monitoring program intended to involve human, institutional, and financial resources of the private sector, and local, state and federal government in long-range, suitably-funded, well-designed electric power plant environmental research programs financed by the Environmental Trust Fund; a revolving fund generated by a surcharge on electricity produced within the state. The Public Service Commission is to grant or deny permits. The law's intent is to insure public knowledge of all information relevant to siting power plants and to provide opportunities for the public's participation. (See also W74-10765) (Auen-Wisconsin)
W74-10783

ELIMINATION OF PHOSPHATE DETERGENTS AND PSYCHOLOGICAL REACTANCE,
Florida Univ., Gainesville. Dept. of Marketing.
For primary bibliographic entry see Field 5C.
W74-10798

PIPE INSPECTION CAMERAS AND TECHNIQUES,
Photo Data Inst., Janesville, Wis.
For primary bibliographic entry see Field 8G.
W74-10828

TOXIC EFFECTS OF FRESHWATER TURBELLARIANS ON SCHISTOSOME MIRACIDIA,
Cincinnati Univ., Ohio. Dept. of Biological Science.
For primary bibliographic entry see Field 5C.
W74-10830

JET PUMP STOPS SAND CLOGGING,
Williston Water Dept., N. Dak.
For primary bibliographic entry see Field 8C.
W74-10831

AMENDED BILL: IMPLEMENTATION OF CONVENTION ON THE PREVENTION OF MARINE POLLUTION BY DUMPING WASTES AND OTHER MATTER.
Committee on Merchant Marine and Fisheries (U.S. House).
For primary bibliographic entry see Field 6E.
W74-10876

DEEPWATER PORTS.
For primary bibliographic entry see Field 6E.
W74-10877

THE JUBILEE OF THE ROYAL COMMISSION STANDARD,
East Suffolk and Norfolk River Authority (England).
F. W. Roberts.
Water Pollution Control, Vol 73, No 2, p 129-137, 1974. 2 tab, 11 ref.

Descriptors: *Sewage disposal, *Standards, Testing, Biochemical oxygen demand, Nitrogen, Temperature, *Water quality standards, Suspended solids, Waste dilution, Reaeration, Potable water, *Administration, Water pollution control, Rivers.
Identifiers: *United Kingdom(Royal Commission on Sewage Disposal).

Factors involved both in setting standards and in assessing river pollution levels suggested by the Royal Commission on Sewage Disposal are discussed. Basic topics reviewed include tests for sewage and sewage effluents, dilution and suspended solids, reaeration capacity, potable water from rivers, and the administration of standards. (Sandoski-FIRL)
W74-10891

WATER LAWS IN USSR,
Himachal Pradesh State Electricity Board, Simla (India).
S. K. Sharma.
Indian Journal of Power and River Valley Development, Vol 23, No 12, p 392-393, December, 1973.

Descriptors: *Riparian rights, *Legislation, Planning, Law enforcement, Resource allocation, *Water pollution control, *Water law.
Identifiers: *USSR.

The water laws of the USSR as embodied in the legislation entitled 'Foundation of Water Manage-

ment Legislation of the Union of Soviet Socialist Republics', passed by the Supreme Soviet in December 1970 are reviewed. This legislation is composed of five main parts: 'General Regulations', ownership, regulation, etc.; 'Water Management', grant of use to municipalities, etc.; 'Protection of Waters and Prevention of Their Detrimental Effect', control of pollution, etc.; 'State Control and Planning of Water Utilization', resources inventory and resource allocation; and 'Responsibility for Breaking the Water Laws', the civil and criminal code as it applies to this legislation. (Shaffer-FIRL)
W74-10893

COUNTY WATER SYSTEM SOLVES DRY AREA PROBLEMS,
Salt Lake County Water Conservancy District, Utah.
For primary bibliographic entry see Field 6D.
W74-10894

RIVERS POLLUTION SURVEY IN SCOTLAND IN RETROSPECT AND PROSPECT,
Secretary of State for Scotland, Edinburgh. Scottish Development Dept.
E. H. Nicoll.
Water Pollution Control, Vol 73, No 2, p 178-181, 1974.

Descriptors: *Rivers, *Surveys, *Sewage treatment, *Water pollution sources, Water quality control, Governments, Legislation, History.
Identifiers: *United Kingdom(Scotland).

A brief review of the legislation and regulations formulated by the Scotish River Commission is presented. A survey report published in 1972 recorded 234 sewerage authorities serving 5.2 million persons with two-thirds of this population being served by drainage systems terminating in tidal reaches of rivers, estuaries, and the open sea. Six percent of all principal rivers were of poor quality or grossly polluted. Expenditures for sewerage, sewage treatment, and disposal are given for 1971. (Sandoski-FIRL)
W74-10896

IS THE WATER SAFE TO DRINK. PART I: THE PROBLEM,
Environmental Defense Fund, Washington, D.C. Water Resources Program.
For primary bibliographic entry see Field 5F.
W74-10897

6. WATER RESOURCES PLANNING

6A. Techniques Of Planning

A MODEL FOR EVALUATING RUNOFF-QUALITY IN METROPOLITAN MASTER PLANNING,
Water Resources Engineers, Walnut Creek, Calif.; Hydrologic Engineering Center, Davis, Calif.; San Francisco City and County Dept. of Public Works, Calif.
For primary bibliographic entry see Field 5D.
W74-10396

SYSTEMATIC DEVELOPMENT OF METHODOLOGIES IN PLANNING URBAN WATER RESOURCES FOR MEDIUM SIZE COMMUNITIES: ECONOMIC AND ENVIRONMENTAL IMPACTS OF SURFACE RUNOFF DISPOSAL SYSTEMS,
Purdue Univ., Lafayette, Ind. Dept. of Agricultural Economics.
W. L. Miller, and S. P. Erickson.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-234 315, $4.00 in paper copy, $2.25 in microfiche. Purdue University Water Resources Research Center Technical Report No 39. 1973. 74 p, 4 fig, 17 tab, 70 ref. OWRR C-3277(no 3713)(5).

Descriptors: *Storm runoff, *Storm water, *Urban runoff, *Water pollution sources, *City planning, Drainage systems, *Urban drainage, *Water quality, *Decision making, Economic impact, Economic efficiency, Planning, Methodology, Surface waters, Surface drainage, Rainfall-runoff relationships, Diffused surface water, Water resources development, Land use, Community development, Urban hydrology, Storm drains, *Indiana.
Identifiers: *Environmental impact, *West Lafayette(Ind), Tippecanoe County(Ind).

The research involves the comparison of alternative system designs to dispose of runoff from rainfall in urban and suburban areas. The systems were compared on the basis of system cost and water quality parameters. This type of comparison provides communities with information about the relationship between cost and water quality. With that information a community can choose that system design which provides the combination of cost and water quality which it selects as most appropriate to its needs. The model developed to compare alternative systems for storm water removal was applied to a watershed in West Lafayette, Indiana. Based on analysis of this watershed, implications were drawn about the drainage system cost and water quality associated with alternative land use in Tippecanoe County, Indiana in the year 2020.
W74-10397

ESSENTIALS OF GROUND-WATER HYDROLOGY PERTINENT TO WATER-RESOURCES PLANNING,
Water Resources Council, Washington, D.C. Hydrology Committee.
For primary bibliographic entry see Field 2F.
W74-10410

OPTIMIZATION TECHNIQUES FOR MINIMIZATION OF COMBINED SEWER OVERFLOW,
Dept. of Civil Engineering. Colorado State Univ., Fort Collins.
For primary bibliographic entry see Field 5D.
W74-10415

THE SOCIAL DIMENSIONS OF WATER-RESOURCES PLANNING,
Anacapa Sciences, Inc., Santa Barbara, Calif.
For primary bibliographic entry see Field 6B.
W74-10416

COMPUTER SIMULATION OF SNOWMELT WITHIN A COLORADO SUBALPINE WATERSHED,
Forest Service (USDA), Fort Collins, Colo. Rocky Mountain Forest and Range Experiment Station.
For primary bibliographic entry see Field 2C.
W74-10424

WATERHEAD FORECAST POSSIBILITIES ON HYDRAULIC BASIS,
For primary bibliographic entry see Field 4A.
W74-10453

TOWARD THE STRUCTURE OF A PRODUCTION FUNCTION FOR WHEAT YIELDS WITH DATED INPUTS OF IRRIGATION WATER,
Indian Statistical Inst., New Delhi. Planning Unit.
For primary bibliographic entry see Field 3F.
W74-10600

OPTIMAL CONTROL OF MULTIUNIT INTER-BASIN WATER RESOURCE SYSTEMS,
Tokyo Inst. of Tech. (Japan). Dept. of Civil Engineering.
For primary bibliographic entry see Field 4A.
W74-10603

6B. Evaluation Process

MODELING THE TOTAL HYDROLOGIC-SOCIOLOGIC FLOW SYSTEM OF URBAN AREAS,
Utah State Univ., Logan. Inst. for Social Science Research on Natural Resources.
For primary bibliographic entry see Field 4C.
W74-10351

PUBLIC PARTICIPATION IN WATER RESOURCES PLANNING AND DECISION-MAKING THROUGH INFORMATION-EDUCATION PROGRAMS: A STATE-OF-THE-ARTS STUDY,
Mississippi State Univ., State College. Social Science Research Center.
P. J. Ross, B. G. Spencer, and J. H. Peterson, Jr.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-234 317 $3.75 in paper copy, $2.25 in microfiche. Mississippi Water Resources Research Institute, Mississippi State, Completion Report, 1974. 46 p, 2 tab, 2 fig, 68 ref. OWRR B-012-MISS(1).

Descriptors: *Social participation, *Education, *Information exchange, *Decision making, *Planning, Reviews, *Mississippi, Design criteria, Model studies.

The purpose was to explore the state-of-the-art of activities to inform and educate publics regarding water resources programs. This objective was sought through (1) a critical and systematic review of literature, including both published and unpublished technical and scientific documents, and (2) a study of information/education programs of agencies involved in various levels of water resources planning and management in the state of Mississippi. The findings suggested two conclusions about past and current participation activities and policies of water resources agencies: (1) not only are water resources agencies keenly aware of the importance of soliciting public input in plans and decisions regarding water resources programs, but efforts undertaken to do so have been substantial; and (2) the sucess of agencies in effectively involving publics in their planning activities and in securing public support for proposals has not been commensurate with the effort expended. The implications of the research for planning effective educational/information programs are discussed. Specific recommendations are incorporated into the design of a model of the planning process.
W74-10393

ESSENTIALS OF GROUND-WATER HYDROLOGY PERTINENT TO WATER-RESOURCES PLANNING,
Water Resources Council, Washington, D.C. Hydrology Committee.
For primary bibliographic entry see Field 2F.
W74-10410

THE MARKET STRUCTURE OF THE SOUTHERN CALIFORNIA WATER INDUSTRY,
Copley International Corp., La Jolla, Calif.
L. D. Schelhorse, M. L. Zimmerman, J. W. Milliman, D. L. Shapiro, and L. F. Weschler.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-234 333, $5.75 in paper copy, $2.25 in microfiche. Completion Report, June 1974. 204 p, 20 fig, 32 tab, 118 ref, 4 append. OWRR C-4007(No 9002)(1).

Descriptors: *Water rights, *Economic efficiency, *Elasticity of demand, *Municipal water, *Regression analysis, *Resource allocation, *Groundwater management, Water resources development, Management, Pricing, Decision-making, *California, Administrative agencies, Administrative decisions, Economies of scale, Water demand, Water utilization, Irrigation water, *Industrial water, Conjunctive use, Public utility districts, Water allocation(Policy).
Identifiers: *Southern California.

An industry analysis deals with three aspects: structure, conduct, and performance. This study examined the salient features of market structure and suggested four hypotheses on conduct and two on economic performance. Water supply in semi-arid Southern California consists of substantial groundwater and meager local surface supplies, augmented by extensive imported water. Three-fourths of the currently imported water supply is utilized by agriculture. A plentiful supply exists under current conditions and for reasonable projections of population growth. Operating costs are relatively low when compared to the high fixed cost of facilities already in place. Apparent economies of scale exist in the construction of water delivery systems. The quantity of water consumed does vary inversely with price, i.e., a non-zero price elasticity of demand exists in the region. There exists a de-facto lack of transferability of water rights in California which is encouraged under court and administrative interpretation of water law and by the logic of public collective decision-making bodies. Political considerations take the place of markets in allocating water among uses and users. The water industry is characterized by a public agency orientation, with access to tax revenues and the ability to charge different prices to various final users. Little vertical or horizontal integration exists.
W74-10414

THE SOCIAL DIMENSIONS OF WATER-RESOURCES PLANNING,
Anacapa Sciences, Inc., Santa Barbara, Calif.
D. H. Harris.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-234 354, $4.00 in paper copy, $2.25 in microfiche. Technical Report 160, March 1974. 90 p, 17 fig, 9 tab, 33 ref, 8 append. OWRR C-4025(No 9005)(1).

Descriptors: *Planning, *Decision-making, *Social aspects, *Social values, *Water resources, *Dimensional analysis, Social participation, Aesthetics, Water quality, Water allocation(Policy), Water conservation, Attitudes.
Identifiers: *Multidimensional analysis, *Factor analysis.

A framework was developed for incorporating social factors (those which concern social well-being and quality of human life) along with technical and economic factors into the water-resources planning-decision process. Initially, 388 water-resources concepts from the social domain were collected, screened, and grouped to define 42 different social factors. Then, from ratings of similarity-dissimilarity by 300 raters, a matrix was generated of mean distances between all 861 possible factor pairs; the matrix was analyzed by computer-based multidimensional scaling techniques to determine the underlying dimensional structure. Finally, using procedures that paralleled those for determining factor similarity-dissimilarity, a value reflecting social importance was developed for each of the 42 factors and for the 5 basic social dimensions which emerged from the multidimensional analysis. These values were found to cover a wide range; however, values for the same factors and dimensions were found to be nearly identical among different sub-groups of people, even those with potentially divergent viewpoints, such as social scientists and water-works professionals. Methods for incorporating appropriate social factors, along with technical and economic factors, were described for each of the seven major components of the water-resources planning-decision process.
W74-10416

LEGISLATIVE HISTORY OF FEDERAL RIVER BASIN PLANNING ORGANIZATIONS,
For primary bibliographic entry see Field 6E.
W74-10520

INCOME DISTRIBUTIONAL CONSEQUENCES OF PUBLICLY PROVIDED IRRIGATION: THE COLUMBIA BASIN PROJECT,
Washington State Univ., Pullman. Dept. of Agricultural Economic.
For primary bibliographic entry see Field 3F.
W74-10524

DISTRIBUTIONAL CONSEQUENCES OF RECREATION PROVISION IN WATER RESOURCE PROJECTS--THE POTHOLES RESERVOIR,
Washington State Univ., Pullman. Dept. of Agricultural Economics.
W. R. Butcher, and C. D. Ditwiler.
Completion Report, July 1, 1974, 3 p. OWRR A-060-WASH(2). 14-31-0001-4048.

Descriptors: *Columbia River, Economics, *Income distribution, *Project post-evaluation, *Recreation, Welfare(Economics), *Washington, Investment, Costs, Government finance, Government supports.
Identifiers: *Columbia Basin Project, *Potholes Reservoir(Wash).

The purpose of this economic study is to investigate the income distributional consequences of the public funds that have created and continue to support and maintain the recreational opportunities of the Potholes Reservoir, located in the central portion of the Columbia Basin Project, Washington. Personal interviews of recreationists conducted during the major part of the recreational season provide data necessary to construct use curves by income class for each major reservoir activity. From these curves, a 'welfare gain' will be computed for each recreational party. From the welfare gain, investment costs made by the recreationist, as well as his contribution through taxes and user fees to cover the public costs, will be subtracted to obtain an estimate of net welfare gain. Classification of the net welfare gain by relevant income classes, geographical area, and occupation and family statuses will be made.
W74-10550

THE MIAMI CONSERVANCY DISTRICT AS A SOCIAL INSTRUMENT,
Johns Hopkins Univ., Baltimore, Md.
A. Wolman.
Journal of the American Water Works Association, Vol 66, No 3, p 139-141, March 1974.

Descriptors: *Social function, *Social participation, History, *Florida, *Water districts, Organizations.
Identifiers: *Miami Conservancy District(Fla).

The history and purpose of the Miami Conservancy District are discussed with emphasis on its application as a social instrument. The District was formed in 1913 after a disastrous flood. It exemplified an epic of achievements in innovating processes of government, of engineering, and of social organization. These essential elements for progressive encounter with new goals are still current. The aims of the District are to plan for the full development of the water resources; to develop intelligent bookkeeping of them; to engage in stream beautification; and to design, construct, maintain, and operate where appropriate waste treatment facilities. The District moved from a relatively static custodial position to dynamic total river management, and a $100 million waste water improvement complex. The District will expand in function and in geographic boundary as it is necessary to maintain its purpose. (Merritt-FIRL)
W74-10560

FIDELITY OF INFORMATION TRANSMISSION IN LOCAL CAMPAIGNS ON WATER ISSUES,
Illinois Univ., Urbana. Dept. of Agricultural Economics and Sociology.
F. C. Fliegel, and J. E. Kivlin.
Available from NTIS, Springfield, Va 22161 as PB-234 543 $4.50 in paper copy; $2.25 in microfiche. Illinois Water Resources Center, Urbana, Research Rept No. 82, March 1974. 108 p, 15 tables, 1 fig, 20 ref, append. OWRR B-052-ILL(1), 14-31-0001-3513.

Descriptors: *Attitudes, Social aspects, *Information exchange, Water supply, Social participation, Legal aspects, Local governments, Treatment facilities, Water pollution.
Identifiers: Plan implementation, Information transmission(Social), Message distortion(Social), Voting, Public issues.

Most issues involving water supply are public issues, and achieving consensus for solution of problems in this area is problematic, therefore a study was designed to assess whether information about water issues is distorted in successive transmissions, thereby inhibiting achievement of consensus. The issue in the study community hinged on expansion of its sewage treatment facility, or losing local industry in order to abate the flow of inadequately treated effluent into a local river. Analysis showed that degree of exposure of information about water pollution, and especially to official information sources, contributed to consensus on the seriousness of the problem, but not to consensus on problem solution. Therefore it seemed unlikely that sheer information loss or other modifications of message content in successive transmissions of information could account for a lack of consensus on problem solution. However, analyzing respondents' basic attitudes as determinants of positions on pollution issues, showed more promising results. Tentative findings indicate that people who view themselves as dependent, and lacking in ability to predict events, are most prone to favor corporate action. It is suggested that information campaigns on public issues should take into account the link between people's basic attitudes and issue-specific attitudes.
W74-10690

PROGRESS IN THE RURAL WATER PROGRAMS OF LATIN AMERICA,
Pan American Health Organization, Washington, D.C.
D. Donaldson.
Bulletin of the Pan American Health Organization, Vol 8, No 1, p 37-53, 1974. 2 fig, 6 tab, 18 ref.

Descriptors: *Potable water, *Water supply, *Rural areas, *Future planning(Projected), Water resources development, South America, Mexico.
Identifiers: *Latin America, Central America.

The proportion of rural people in Latin America with access to potable water rose dramatically during the last decade. The current situation is detailed and a number of existing problems are explored. Past programs have tended to concentrate on village or 'urban' areas in order to reach the most people in the shortest time at the lowest cost, favoring 'revolving' funds to supply internal financing and the 'mass approach' to coordinated rural community development. (Sandoski-FIRL)
W74-10887

6C. Cost Allocation, Cost Sharing, Pricing/Repayment

MINNESOTA FLOODS, 1972--COSTS, PROGRAMS AND POLICY IMPLICATIONS,
Minnesota Univ., Minneapolis. Dept. of Agricultural and Applied Economics.
For primary bibliographic entry see Field 6F.
W74-10417

INCOME DISTRIBUTIONAL CONSEQUENCES OF PUBLICLY PROVIDED IRRIGATION: THE COLUMBIA BASIN PROJECT,
Washington State Univ., Pullman. Dept. of Agricultural Economic.
For primary bibliographic entry see Field 3F.
W74-10524

ECONOMICS OF LAND USE REGULATION IN FLOOD HAZARD AREAS,
Minnesota Univ., St. Paul. Agriculture Extension Service.
For primary bibliographic entry see Field 6F.
W74-10529

COST OF DEVELOPING GROUND WATER IN THE PAT HARRISON WATERWAY DISTRICT, MISSISSIPPI,
University of Hattiesburg, Southern Missippi. Bureau of Business Research.
For primary bibliographic entry see Field 4B.
W74-10530

TOWN 'CAPTURES' NATURAL SPRING: CUTS WATER TREATMENT COSTS,
Allen and Hoshall, Memphis, Tenn.
For primary bibliographic entry see Field 5F.
W74-10567

PRICE RESPONSIVENESS OF THE INDUSTRIAL DEMAND FOR WATER,
Lehigh Univ., Bethlehem, Pa. Dept. of Economics.
For primary bibliographic entry see Field 6D.
W74-10597

DETERMINATION OF INVESTMENT COST FUNCTIONS OF WATER TREATMENT PLANTS,
Illinois Univ., Urbana. Dept. of Business Administration.
For primary bibliographic entry see Field 5F.
W74-10691

6D. Water Demand

THE MARKET STRUCTURE OF THE SOUTHERN CALIFORNIA WATER INDUSTRY,
Copley International Corp., La Jolla, Calif.
For primary bibliographic entry see Field 6B.
W74-10414

PRICE RESPONSIVENESS OF THE INDUSTRIAL DEMAND FOR WATER,
Lehigh Univ., Bethlehem, Pa. Dept. of Economics.
J. De Rooy.
Water Resources Research, Vol 10, No 3, p 403-406, June 1974. 4 tab, 12 ref.

Descriptors: *Water demand, *Industrial water, *Prices, Water utilization, Industrial plants, Chemical industry, New Jersey, Water quantity, Equations, Estimating, Technology, Employment, Regression analysis, Mathematical models, Systems analysis.
Identifiers: Production function, Price elasticity, Disaggregation.

Examined is the sensitivity of the industrial demand for water to changes in price. A simple model of the demand for water by manufacturing firms provides evidence that industrial users respond significantly to even small changes in unit cost (used here as proxy for market price). Demand is also significantly affected by changes in output, by technological improvements, and by employment. The model is disaggregated since requirements for intake are dependent on the intended type of use and since the cost of water supply is related to qualitative requirements, which depend on type of use. Separate equations are given for each of four water use categories common to manufacturing operations: (1) cooling; (2) processing; (3) steam power; and (4) sanitation. Model parameters are estimated with data collected from a survey of water use of 30 large chemical manufacturing plants in northern New Jersey in 1965. (Bell-Cornell)
W74-10597

REPORT ON THE LAMBOURN VALLEY PILOT SCHEME, 1967-1969,
Thames Conservancy, Reading (England).
For primary bibliographic entry see Field 4B.
W74-10862

PROGRESS IN THE RURAL WATER PROGRAMS OF LATIN AMERICA,
Pan American Health Organization, Washington, D.C.
For primary bibliographic entry see Field 6B.
W74-10887

COUNTY WATER SYSTEM SOLVES DRY AREA PROBLEMS,
Salt Lake County Water Conservancy District, Utah.
R. B. Hilbert, and R. T. Holzworth.
Public Works, Vol 105, No 6, p 72-73, June 1974.

Descriptors: Water resources, *Municipal water, Water resources development, Planning, *Water supply, Water distribution, *Arid climates, *Utah, *Local governments, Cities, Land use, *Water districts, *Comprehensive planning.
Identifiers: *Salt Lake City(Utah).

Discussed are the problems and complexities involved in the supply of adequate water to a large and expanding metropolitan area where average annual rainfall is only 16 inches. Using a mix of facilities including deep wells, springs, river diversions, runoff impoundment, and groundwater management, Salt Lake City has been able to meet its needs to date. Future growth in the area appears to depend on the willingness of the state to support the importation of water from outside the Salt Lake City region as all local resources are almost fully development. The need for land-use planning and comprehensive consideration of a multitude of factors in future water supply is discussed. (Shaffer-FIRL)
W74-10894

CAN DREDGING BE CONTINUED TO MAINTAIN GREAT LAKES,
Corps of Engineers, Chicago, Ill. North Central Div.
C. Cable.
World Dredging and Marine Construction, Vol 10, No 5, p 24-27, May, 1974. 5 fig.

Descriptors: *Dredging, *Solid wastes, Disposal, Harbors, Channels, *Chennel improvement, Environmental effects, Costs, *Great Lakes, Research and development, *Waste disposal, Canals.
Identifiers: Polluted dredge material, *Land disposal.

Escalating dredging costs, environmental concerns, inflation, misinformation, and moratoriums on dredging have raised the issue of whether dredging operations can be contined on the Great Lakes. The Army Corps of Engineers maitains 64 harbors, 157 miles of improved channel, and the locks of the St. Mary's Falls Canal. Normal dredging workload amounts to around 12 million cubic yards for maintenance and 1 million cubic yards for the improvement of these facilities each year. For the past six years the dredging level has been restricted to about 50 percent of normal and will continue to be curtailed until suitable disposal sites on land can be found and prepared to take polluted dredge material. There are 71 dredging projects which will require land disposal sites. The Corps is currently developing plans for 16 of these sites. Two sites are moving into preparation now with the other 14 to start later this year. The Corps at its waterways Experiment Station is currently engaged in research in seven broad areas: environmental impacts and aspects of open water disposal; environmental impacts and aspects of land disposal; new disposal concepts; productive uses of dredged material; disposal area reuse and multiple utilization; dredge material treatment techniques and equipment; and dredging/disposal equipment and techniques. (Shaffer-FIRL)
W74-10899

6E. Water Law and Institutions

RHODE ISLAND'S OCEAN SANDS: MANAGEMENT GUIDELINES FOR SAND AND GRAVEL EXTRACTION IN STATE WATERS,
Rhode Island Univ., Kingston. Coastal Resources Center.
For primary bibliographic entry see Field 5G.
W74-10437

WATER AND POLITICS IN COASTAL CALIFORNIA - THE DIABLO CANYON EXPERIENCE,
Washington Univ., Seattle. Dept. of Political Science.
For primary bibliographic entry see Field 5D.
W74-10480

PUBLIC WORKS FOR WATER AND POWER DEVELOPMENT AND ATOMIC ENERGY COMMISSION APPROPRIATIONS BILL, 1974, PART 5, TENNESSEE VALLEY AUTHORITY.
Hearings---Subcomm of the Committee on Appropriations---United States House of Representatives, 93rd Cong, 1st Sess, May 1, 1973. 412 p.

Descriptors: *Tennessee Valley Authority, *Tennessee, *Federal project policy, *Cost benefit analysis, *Flood control, Direct benefits, Direct costs, Economic justification, Research and development, Nuclear wastes, Water resources development, Watershed management, Water cooling, Economic feasibility, Tennessee River, Navigation, Water quality, Planning, Construction.

Present in these hearings concerning the Tennessee Valley Authority, as witnesses, were the TVA director of tributary area development, the director of water control planning, and the director of fisheries, among others. Discussed in the hearings are the benefits of flood control in saving property loss. Also presented is the budget for the Tennessee Valley Authority. The witnesses discussed allocations for studies and programs concerning the effect of heated water on the environment, water resources management, fisheries and water fowl management, water quality management, as well as navigation. The Public Works Subcommittee members questioned the various witnesses on expenditures placed in their budgets and received the reasons and justifications for those expenditures. (Sperling-Florida)
W74-10500

COMPACT FOR DEVELOPMENT OF DEEP DRAFT HARBOR AND TERMINAL.
Miss. Code Ann., secs. 59-6-1 to 59-6-7 (Supp. 1973).

Descriptors: *Mississippi, *Alabama, *Interstate compacts, *Port authorities, Adoption of practices, Coastal structures, Governments, Political aspects, State governments, Navigation, Federal government, Administration, Administrative agencies, Boats, Cost allocation, Economic aspects, Budgeting, Coordination, Harbors, Administrative costs, Decision making, Legislation, Management, Project planning.
Identifiers: *Administrative regulations, Deep draft harbors.

An interstate compact is authorized with the state of Alabama concerning the construction of deep draft harbors and terminals. The compact is aimed at a joint deep draft harbor and terminal on the continental shelf in the Gulf of Mexico. Also established is an authority to administer the project and the number of persons in the authority, their terms, renumeration, time of meetings, and method of appointment. The authority has power to conduct studies and surveys of all problems, benefits, and other matters associated with the deep draft facilities. They may also conduct hearings to achieve these ends. They can accept, hold, and dispose of any money acquired by gift or otherwise. The authority will formulate plans and policies for the purpose of smphasizing this cimpact befor Congress and other appropriate federal agencies. The contribution of each state will be in the proportion that its population bears to the total population of the party states. The statute also grants the necessary power to the governor, the compact administrator, and the Gulf Coast Superport Development Authority for Mississippi to carry out the purposes of the compact. (Sperling-Florida)
W74-10501

ANNUAL STATE STRATEGY FOR WATER QUALITY CONTROL, FISCAL 1973-74.
California State Water Resources Control Board, Sacramento.
For primary bibliographic entry see Field 5G.
W74-10502

WATER SUPPLY.
N.Y. Environmental Conservation Law, secs. 15-1501 thru 15-1529 (1972).

Descriptors: *Water supply, *Water demand, *Multi-purpose projects, *Water resources development, *New York, Water conservation, Legislation, Cost allocation, Structures, Permits, Reservoir operation, Water resources, Water rights, Inter-agency cooperation, Reservoirs, Water management(Applied).

Water resources and the need for additional water supplies are discussed. Maps or plans of new or additional sources of water supply must first be submitted to the New York Department of Environmental Conservation and approved before operations may proceed. Application for approval of plans must be in writing and contain proof of adequate authorization for the project, including a map of the lands to be acquired and plans of the proposed construction, if any. After such application has been submitted, the department, upon notice, shall conduct public hearings to determine the project's feasibility. Consent of the department must be had to deliver any water to any other state. Application procedures for municipal water supply reservoirs on forest preserve lands are set forth in much the same manner. Within five years of the approval of these plans, the applicant may petition the department to construct the reservoir and appurtenant works. The cost of any such project shall be paid by the applicant, and the supervision and operation of the works will be under the direction of the departments of transportation and conservation. The reservoir shall be owned by the state, and lands thereunder shall be conveyed to the state by the applicant. Provisions are then set forth for reservoir repairs, supply to other public water systems, and the payment of damages. (Sutton-Florida)
W74-10504

THE BLACK TIDE,
Washington Univ., Seattle. Center for the Biology of Natural Systems.
For primary bibliographic entry see Field 5G.
W74-10505

THE FEDERAL OCEAN PROGRAM. THE ANNUAL REPORT OF THE PRESIDENT TO THE CONGRESS ON THE NATION'S EFFORTS TO COMPREHEND, CONSERVE, AND USE THE SEA.
Office of Science and Technology, Washington, D.C.
April 1972. 122 p, 26 photo, 5 fig.

Descriptors: *Federal government, *Research priorities, *Marine biology, *Mapping, *Research facilities, Commercial fishing, Fisheries, Coasts, Continental shelf, Oceanography, Oceans, Estuaries, Monitoring, Forecasting, Marine geology, Geophysics.
Identifiers: *Federal ocean program.

During 1971, strong emphasis was placed on improvements in the management of living and nonliving marine resources, on easing pressures which threaten certain species with extinction, and on enforcement of measures to prevent environmental pollution and degradation. Studies have been stepped up in the management of coastal zones to protect fisheries, to make them available for marine transportation, to minimize pollution, and to enhance their recreational values. In relation to energy supplies, the Federal Ocean Program has moved to explore the geophysical and geological character of the continental shelves. Extensive work is underway in monitoring, predicting, and mapping the oceans and ocean floors. Many large-scale studies are underway at ocean 'laboratories' with arrays of ships, specially designed buoys, aircraft, eath-orbiting satellites, and submersibles to apply collective efforts to solve special problems and to advance the national capability in marine sciences and technology. (Conko-Florida)
W74-10506

WATER AUTHORITIES.
Ill. Ann. Stat., ch. Ill 2/3, secs. 225, 227, 227.1, 228 (Smith-Hurd Supp. 1973).

Descriptors: *Water control, *Water policy, *Illinois, *Legislation, *Water distribution, Water allocation, Distribution systems, Water delivery, Water systems, Water resources, Water resources development, Water utilization, Water management, Natural resources, Public utility, Utilities, Water requirements, Local governments, Water supply, Water sources.

Illinois water guidelines are set out for the Board of Trustees of authorities. Each authority shall have a governing board of at least three trustees, the number to depend upon the political and geographical makeup of the authority. The terms of office shall vary from one to three years for the several trustees. After the authority has been organized and the trustees have once been appointed, the successive trustees shall be elected by the constituents of each authority. Each trustee shall furnish a $5,000 security bond to assure the faithful performance of his duties and the faithful accounting for all moneys that may come into his hands. Various provisions are also included in regard to elections, petitions and ballots which may concern the authorities. Also included are various provisions dealing with effective dates of office and other political and governmental functions. (Silber-Florida)
W74-10507

RECREATIONAL DEVELOPMENT.
Tenn. Code Ann., secs. 11-1201 thru 11-1207 (1965).

Descriptors: *Recreation, *Recreation facilities, *Community development, Federal project policy, Federal government, Administration, Federal budget, Cost sharing, Legislation, Tennessee, Adoption of practices, State governments, Political aspects, Water sources development.

The state of Tennessee should participate in the benefits of private, local and federal government assistance programs for the planning and development of outdoor recreational resources. Toward this purpose, the acquisition of such land and water areas as the Commissioner of Conservation deems necessary is provided for. The Commissioner may apply for participation in or the receipt of aid from any federal programs respecting outdoor recreation. He may enter into contracts with appropriate federal agencies, keep records of such actions, and furnish such reports and information as may be necessary to enable officials and agencies to perform their duties under such programs. A non-salaried Recreational Advisory Committee is created. If funds from local sources are available, the Commissioner may enter into and administer agreements with the federal government for planning, acquisition and development projects involving participating federal-aid funds. Funds from the state treasury shall be distributed in the normal manner. (Sutton-Florida)
W74-10508

OIL POLLUTION CONTROL.
N.C. Gen. Stat., secs. 143-215.75 thru 143-215.82 (1973).

Descriptors: *North Carolina, *Public health, *Oil wastes, *Water pollution sources, *Oil pollution, Safety, Waste water disposal, Administrative agencies, Oily water, Onsite tests, On-site investigations, Regulation, Administration, Legal aspects, Wildlife conservation, Sewerage districts, Local governments, Oil spills, Water pollution control, State governments.

The purpose is to promote the health and safety of the public by protecting the land and waters from pollution by oil, oil products, and oil by-products. The North Carolina Board of Water and Air Resources shall make inspections and investigations to assure compliance with the statute, and to determine the nature and location of any oil discharged into the state's waters. The authorized representatives of the Board upon presentation of their credentials can enter upon any public or private property to inspect, investigate, or to disperse or remove oil discharges. Any information which is confidential, but discovered or obtained in the course of an inspection will not be revealed, except by lawful order or process. No power granted to the Board will be construed to deny any local government, sanitary or sewerage district from exercising polic powers with reference to the prevention and control of oil discharges into sewers or disposal systems. (Sperling-Florida)
W74-10509

IN RE MAINE CLEAN FUELS, INC. (JUDICIAL REVIEW OF DENIAL OF APPLICATION FOR PROPOSED OIL REFINERY).
310 A.2d 736 (Me. 1973).

Descriptors: *Maine, *Judicial decisions, *Legal aspects, *Permits, *Standards, Regulation, Environmental protection, Natural resources, Management, Development, Administrative decisions, Legislation, Political aspects, Ecology, Water resources development, Oil industry, Environmental effects, Administrative agencies, State governments.

A proceeding in the Supreme Judicial Court of Main by an unsuccessful applicant for development of an oil refinery is presented. The petitioner's application was denied by Main's Environmental Improvement Commission. The Maine Supreme Court held that the state's Site Location Law was constitutional, that the Commission's procedures did not violate due process and that there was substantial evidence to support the findings of the Commission that the applicant had failed to sustain the burden of proving that it could meet each of the statutory criteria. The Site Location Law was enacted to provide the state with a means of minimizing, through the exercise of its police power, the irreparable damage being done to the environment. As long as the methods adopted by the legislature to be used by the Commission in evaluating applications are rationally related to the purpose of the enactment, they are a valid exercise of the police powers. Inherent within the power of an administrative agency is the discretion to prescribe its own rules of procedure and to alter those rules when necessary for the achievement of its objectives. Relaxation or modification of such rules is not reversible error, absent a showing of injury or substantial prejudice. (Silber-Florida)
W74-10510

MISSOURI RIVER BASIN COMMISSION, ANNUAL REPORT FOR FY ENDING JUNE 30, 1972.
Water Resources Council, Washington, D.C.
Available from Nat Tech Info Serv, Springfield, Va 22161 as PB-221 027, $3.00 paper copy, $2.25 microfiche. 1972, 12 p.

Descriptors: *River basins, *River basin commissions, *River basin development, *Water Resources Planning Act, Missouri River, Interstate commissions, River systems, Watersheds(Basins), Drainage, Water sources, Running waters, Land use, Water resources, Water resources development, Missouri, Legislation, Rivers, Planning.
Identifiers: *Missouri River Basin Commission.

In 1972, President Nixon, in accordance with the Water Resources Planning Act of 1965, established the Missour River Basin Commission. The annual report of the Commission is presented for the fiscal year 1972. The Commission serves as the principal agency for the coordination of federal, state, interstate, local and nongovernmental plans for the development of water and related land resources in the basin. The primary function of the Commission is to prepare and keep up to date a comprehensive coordinated joint plant for the Missouri River Basin. Since its first organizational meeting in 1972, the Commission has accepted management and coordination responsibility for the Platte River Comprehensive Study, Nebraska. In addition, funding for a Comprehensive Study of the James River Basin in the Dakotas was requested for fiscal year 1974. (Flowers-Florida)
W74-10511

NEW ENGLAND RIVER BASINS COMMISSION 1973 ANNUAL REPORT.
New England River Basins Commission, Boston, Mass.
1974. 36 p, 30 photo.

Descriptors: *Water resources development, *River basins, *Water pollution control, *Project planning, *Programs, Decision making, Interagency cooperation, Federal government, New England, Water pollution sources, Flood plain management, Land use control, Coastal zone management, River basin commissions, River basin development.
Identifiers: *New England River Basin Commission.

An account is presented of efforts, including programs for coastal zone management, land use control, and new directions for established programs such as water pollution control, under the theme of 'Strategies for Natural Resources Decision-Making.' Important state initiatives are described and some of the New England River Basins Commission's programs to help deal with resource management issues in the region, in individual states and in those areas where major joint federal-state planning programs are underway are discussed. Special studies which were undertaken such as offshore oil, peaking power and flood plain management are discussed. The guide plan programs for Vermont, New Hampshire and Maine are discussed. Comprehensive planning programs including the Southeastern New England Study, the Long Island Sound Study and the Connecticut River Basin Program are examined. (Sutton-Florida)
W74-10512

HARTWIG V. U.S. (SEEKING DAMAGES AGAINST GOVERNMENT RESULTING FROM FLOODING).
485 F 2nd 615-622 (ct cl 1973).

Descriptors: *Judicial decisions, *Legal aspects, *Eminent domain, *Dams, *Flood damage, Condemnation, Irrigation, Floods, Erosion, Siltation, Damages, Flood control, Hydroelectric power, Flood protection, Compensation, Condemnation value, Benefits.
Identifiers: *Inverse condemnation.

Plaintiffs, owners and lessees of land, alleged that the operation of a series of dams caused extensive flooding, resulting in the permanent destruction of a portion of their land through erosion and the deposit of silt, as well as destruction of fences, irrigation ditches and other improvements. They contended that the actions of the government's agents in operating these dams constituted a taking of their property for which just compensation lay. A well-defined legal principle states that the United States is not liable for flood damage unless it is directly attributable to governmental action. Indirect or consequential damages are not compensable. To separate direct injuries from those which are consequential, the plaintiff must show that the property would be subjected to inevitably recurring inundation due to the action of the government. One or even several floods would not necessarily constitute a taking. Plaintiffs here failed to show that the situation is a continuing condition that will inevitably lead to future floods which would not otherwise occur. The plaintiffs' proximity to the federal irrigation project increased the value of their property, and through the facts presented, the plaintiffs failed to develop the losses which they suffered versus the benefits derived. (Ritchie-Florida)
W74-10515

WATER POLLUTION--PROHIBITIONS.
N Y Environmental Conservation Law, secs 17-0501 thru 17-0511 (1972).

Descriptors: *Water pollution, *Water pollution sources, *Water pollution treatment, *New York, Environmental sanitation, Water quality control, Waste water treatment, Water conservation, Legislation, Administration, Waste disposal, Water quality, Water pollution control, Pollutants, Water supply, Permits.

Prohibitions against water pollution are established. There is a general provision making it unlawful for any person to discharge organic or inoganic matter into New York state waters that shall violate established water pollution standards. A more specific prohibition is aimed toward pollution control of waters in the marine district which might be injurious to edible fish and shellfish. This provision covers sewage, industrial wastes, garbage and refuse of any kind. A permit is required for the making or use of a new outlet into state waters and for the operation or construction of disposal systems. A permit is also required to increase or alter the content of wastes discharged. The minimum degree of treatment required for the discharge of sanitary sewage will be the removal of substantially all floating and settleable solids and the removal of that amount of suspended solids normally expected from primary settling. Additional treatment may be required consistent with standards established for specific waters by the New York Department of Environmental Conservation. The use of existing or new outlets which discharge wastes shall be in compliance with all rules and regulations promulgated by the department. (Sutton-Florida)
W74-10516

ASKEW V. AMERICAN WATERWAYS OPERATORS, INC., REVISITED (COMMENTARY).
For primary bibliographic entry see Field 5G.
W74-10518

NEW WATER LAWS--WHAT THEY MEAN TO YOU,
Minnesota Dept. of Natural Resources, St. Paul. Div. of Waters, Soils and Minerals.
L. Seymour.
The Minnesota Volunteer, p 54-62, January/February 1974.

Descriptors: *Minnesota, *Water permits, *Water law, *Legislation, *Drainage programs, Alternative water use, Hydrology, Administrative decisions, Water policy, Flood plain zoning, Water resources development, Floodways, Flood protection, Regulation, Rivers, Streams, Flood control, Multiple purpose projects, Reservoir operation, Reservoir, Water management(Applied), Watershed management, Land management, Wild rivers.

In 1973 the Minnesota Legislature enacted several significant water laws. The Water Resources Permit Laws redefine and increase the regulatory scope of the Department of Natural Resources (DNR) to include all natural waters and waters beneficial to public use. DNR may require an impact statement from any developer to show that the development is reasonable, practical, and will adequately protect public safety and promote the general welfare. Generally, the law requires a permit and the permit is not a right but a privilege. The State Drainage Code directs DNR to develop criteria for establishing and improving drainage systems. DNR is to consider private and public cost-benefit analysis, availability of agricultural land, flooding characteristics of land, alternative conservation and water allocation measures, water quality, effect on wildlife and fisheries, ground water availability and a composite environmental impact statement. The Municipal Shoreland Management Act gives DNR the authority to include incorporated municipalities into Minnesota's Shoreland Management Program. DNR will administer flood plain management programs and dam management procedures. The co-ordination of these functions will allow more effective and safer use of rivers and reservoirs. (Barnes-Florida)
W74-10519

LEGISLATIVE HISTORY OF FEDERAL RIVER BASIN PLANNING ORGANIZATIONS,
T. M. Schad.
In: Organization and Methodology for River Basin Planning, p 85-103, 1967.

Descriptors: *River basin commissions, *River basin development, *Planning, *Water resources development, Water utilization, Flood control, Land management, Wildlife conservation, Recreation, Water conservation, Water quality, Water supply, Administration, Waste water treatment, Federal government, State governments, Cooperatives, Florida, South Carolina, Georgia,

Alabama, Navigable waters, Public health, Irrigation, Electric power plants.

Federal river basin planning organizations have evolved from three central concepts that have pervaded federal water resources planning activity. These three concepts are the federal study commission as a means of planning water resources development, the comprehensive planning concept, and the move toward joint federal and state participation in water resources planning. A bill providing for the Southeast River Basins Study Commission passed Congress in 1958. The purpose of the Commission was to provide a cooperative study on promoting the conservation, utilization, and development of land and water resources in the states of South Carolina, Georgia, Florida, and Alabama. Subjects to be covered were flood control and prevention, domestic and municipal water supplies, navigation safeguarding, land reclamation and irrigation. The study also was to cover the feasibility of hydroelectric power, recreation potentials, soil and forest conservation, pollution abatement, public health, and management of wildlife resources. (Sperling-Florida)
W74-10520

THE PROTECTION OF MARITIME ENVIRONMENT BY THE COURTS OF THIRD STATES: SOME DIFFICULTIES,
Cape Town Univ. (South Africa).
D. J. Devine.
McGill Law Journal, Vol 19, No 2, p 279-283, Fall 1973. 14 ref.

Descriptors: *International law, *International waters, *Law of the sea, *Governmental interrelations, *Africa, Legal aspects, Foreign countries, Political aspects, Regulation, Water law, Oceans, Aquatic environment, Ecology, Environmental control, Foreign waters, Natural resources, Continental shelf.
Identifiers: *Territorial waters, *Injunctive relief, *International agreements, *Territorial seas(Jurisdiction), *South Africa.

The enactment and enforcement of laws for the protection of the maritime environment present special problems in international law. A case in South Africa, South Atlantic Islands Development Corp., Ltd. v. Buchan, 1971 (1) S.A. 234 (c) illustrates some of these problems. A dispute in a South African court arose over the right to fish within the 12 mile territorial limit of Tristan da Cunha. Tristan da Cunha had allegedly granted exclusive rights to South Atlantic Ltd. The court held that it lacked the jurisdication to grant the injunctive relief sought due to the difficulty of enforcement and the inappropriateness of deciding an in rem dispute in a court other than the one in the nation where the problem originated. Systematic protection of the maritime environment is unlikely to occur on an international level within the next decade. The problem presented by the South Atlantic case could be ameliorated by an international agreement to encourage reciprocal enforcement of environmental protection laws. The decisions should be res judicata for the courts of all the signatories. (Deckert-Florida)
W74-10521

SIERRA CLUB V. MASON (MOTION TO VACATE INJUNCTION BARRING HARBOR DREDGING PROJECT).
365 F Supp 47-50 (D Conn 1973).

Descriptors: Water resources development, *Judicial decisions, *Project planning, *Harbors, Coastal engineering, *Connecticut, Environmental effects, Deep-water habitats, Ecology, Legal aspects, Feasibility studies, Federal project policy, Water policy, Dredging, Coasts, Organizations, Conservation.
Identifiers: Injunctive relief, *Environmental Impact Statements, National Environmental Policy Act(NEPA).

The Sierra Club secured a preliminary injunction, made final on May 10, 1973, barring the Corps of Engineers from undertaking a harbor dredging project until the filing of an environmental impact statement (EIS). Such a statement was made available in August 1973. The Corps sought to vacate that injunction while plaintiff sought, on cross motion, a modification of it requiring the Corps to abide by the assurances contained in the EIS. Both motions raised issues regarding the role of a District Court in implementing the National Environmental Policy Act (NEPA). The court stated that since the injunctive relief was conditional on the filing of an EIS, and the condition had been satisfied, the original injunction ought to be dissolved. The modification request raised two issues: whether the plaintiff has a right entitled to protection; and whether the defendent, unless restrained, will engage in conduct alleged to impair plaintiff's right. While stating the first issue was not free from doubt, as NEPA contains no explicit provision requiring performance of every commitment made, the court felt a decision as to the existence of a legally enforceable right would be inappropriate, absent an indication that the Corps had threatened non-compliance with the statement. As no such showing was made, the modification motion was denied. (Sutton-Florida)
W74-10522

ENVIRONMENT IMPACT REQUIREMENTS IN THE STATES: NEPA'S OFFSPRING,
Center for California Public Affairs, Claremont.
T. C. Trzyna.
Copy Available from GPO Sup Doc as EP1.23:600/5-74-006, $1.30; microfiche from NTIS, Springfield, Va 22161 as PB-234 384, $2.25. Environmental Protection Agency Socioeconomic Studies Series Report EPA-600/5-74-006, April 1974. 83 p, 194 ref. EPA Program Element 1HA095. 68-01-1818.

Descriptors: Environmental effects, Legal aspects, *State governments, Legislation, Regulation, Land use, *California.
Identifiers: State Environmental Protection Acts, *Environmental impact statements.

There is a growing trend in the States to adopt requirements for environmental impact statements like those in the National Environmental Policy Act fo 1969. Fifteen States and Puerto Rico now require impact statements for a wide range of activities significantly affecting the quality of the environment, and several others apply the process to limited classes of projects. At least twenty other States have such requirements under consideration. The State requirements are summarized and compared to each other and to the national act. Some key issues are discussed: contents of the impact statement, applicability to private projects and local governments, relation to land use regulation, enforcement, and citizen participation. (EPA)
W74-10527

MANAGEMENT AND ADMINISTRATION OF GROUND WATER IN INTERSTATE AQUIFERS, PHASE II,
Bittinger (M. W.) and Associates, Inc., Fort Collins, Colo.
For primary bibliographic entry see Field 4B.
W74-10537

LEGAL ASSURANCES OF ADEQUATE FLOWS OF FRESH WATER INTO TEXAS BAYS AND ESTUARIES TO MAINTAIN PROPER SALINITY LEVELS,
Texas Univ., Austin. School of Law.
C. W. Johnson.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-222 036, $3.00 in paper copy, $2.25 in microfiche. Published by Texas Law Institute of Coastal and Marine Resources, Houston, Reprinted from: Houston Law Review, Vol 10, p 598-640, 1973.

Descriptors: *Texas, *Water law, *Estuaries, *Water policy, *Natural resources, Conservation, Planning, Land development, Land management, Water management, Water development, Riparian rights, Legal aspects, Judicial decisions, Public lands, Estuarine environment, Aquatic life, Bays, Coasts, Shores, Streams, Streamflow, Tides, Sea water, Saline water-fresh water interfaces, Pollution, Pollution control, Pollution abatement, Filling, Dredging, Marine life.
Identifiers: *Public trust doctrine, *Coastal zone management.

Water in coastal bays, lagoons and estuaries is a mixture of sea water, rain, and inflows from streams, groundwater and surface runoff. Increased water utilization, storage, reuse and interbasin transfers expectedly will reduce the volume of such inflows and alter the seawater-freshwater balance of these areas. Only with proper salinity balance can the unique biological characteristics of the estuarine zones be maintained. The Texas coast represents a significant 1800 miles of shoreline of which 1419 miles are bays and estuaries and another 373 miles faces the Gulf. Water pollution, filling and dredging are the most immediate threats, as well as alteration of the salinity balance. The most immediate effects are felt by marine and estuarine life, as the fresh water inflow so often diverted contains many essential nutrients. Riparian rights are of little or no significance in assuring a proper fresh water flow to estuaries. Texas may be able to rely on the public trust doctrine as its vehicle, maintaining state ownership of tidal lands, waters and resources, in trust for the public's benefit. Although the judicial temperament towards such a policy is uncertain, it seems to have received favorable acceptance in many jurisdictions and eliminates the pitfalls encountered by attacking the problem via the riparian rights approach. (Silber-Florida)
W74-10549

PUBLIC WORKS FOR WATER AND POWEER DEVELOPMENT AND ATOMIC ENERGY COMMISSION APPROPRIATION BILL, 1975, PART I, PART II.
Hearings--Subcomm on Water Resources, Comm on Appropriations, U.S. House of Representatives, 93d Cong, 2d Sess, 1974. 1362 p.

Descriptors: *Federal government, *Government finance, *Federal project policy, *Project planning, Cost sharing, Water policy, Water resources, Water resources development, Dams, Flood control, River basins, River basin commissions, River basin development, Delaware River Basin Commission, Land management, Water utilization, Water management(Applied), Environmental effects.
Identifiers: Army Corps of Engineers.

These hearings were held in connection with the 1975 Public Works for Water and Power Development and Atomic Energy Commission Appropriation Bill. Statements were taken by the Chief and the heads of various divisions of the Army Corps of Engineers in connection with its fiscal year 1975 budget. Statements and budgets were also inserted regarding the Delaware River Basin Commission and the Susquehanna River Basin Commission. The proposed budget for the Army Corps of Engineers was less than that of a year earlier. The Chief of the Corps cited delays in both new and partially completed projects to be the effect of responsibilities imposed upon the Corps by recently enacted environmental legislation, specifically the National Environmental Protection Act and the Flood Disaster Protection Act. The water resources program conducted by the Corps of Engineers has been influenced by environmental considerations, policy issues on cost sharing and use fees, greater competition for federal funds, and the energy crisis. Although these major factors have resulted in a significant reduction of new construction starts, they have improved program management. (Ritchie-Florida)
W74-10697

THERMAL POLLUTION--A GROWING CONCERN,
Michigan Dept. of Natural Resources, Lansing.
For primary bibliographic entry see Field 5G.
W74-10698

COLOMBIA'S VIEW OF MARITIME LEGAL PROBLEMS,
G. Wood.
In: Sea Grant Publication UNC-SG-73-01, p 191-197, March, 1973. 26 ref.

Descriptors: *South America, *Oceans, *Continental shelf, *International law, *Law of the sea, Jurisdiction, Natural resources, Exploration, Exploitation, Foreign countries, Legal aspects, Foreign waters, International waters, Treaties, Commercial fishing, Political aspects, Beds, Ownership of beds, Water rights, Riparian rights, Navigable waters.
Identifiers: *Colombia(SA).

The 1945 Truman Proclamation marked the beginning of many of the Latin American maritime legal problems. The doctrine provided the opportunity for unilateral action by any riparian state to declare increased sovereignty and jurisdiction over contiguous seas and the resources beneath. The present situation thus encompasses a potpourri of individual proclamations by Latin American nations delimiting territorial waters, fishing rights, and continental shelf exploration and exploitation. The main element in common among these proclamations is a desire to extend sovereignty and jurisdiction over the contiguous sea and its resources. Running contrary to this Latin American trend is the position taken by Colombia. Aloofness and idealism best describe Colombia's approach to these problems. Since the Truman Proclamation, Colombia has advocated a fairly steadfast position of restricted sovereignty and jurisdiction over the sea's resources. Colombia has changed and now advocates the 12 mile limit on territorial waters. The end of Colombia's restrictive approach indicates the extent of her frustration and the end of her advocacy of an international maritime regulatory body. (Ritchie-Florida)
W74-10699

FRENCH LAW AND THE POLICY TOWARD POLLUTION IN THE MEDITERRANEAN,
W. V. Brown, II.
In: Sea Grant Publication UNC-SG-73-01, p 198-203, March, 1973. 27 ref.

Descriptors: *Seashores, *Oceans, *International law, *Foreign waters, *Water pollution sources, Oil, Oil pollution, Water pollution, Law of the sea, Foreign countries, Seawater, Water pollution control, Land development, Water management(Applied), International waters, Continental shelf, Land management, Municipalities, Waste water treatment, Waste treatment.
Identifiers: *France, *Mediterranean Sea.

The laws and policy of France are described, as it faces the tragic and rapid metamorphosis of the Mediterranean Sea. Increasing French affluence has led to irreversible development in many of the coastal cities, as hotels and vacation retreats have sprung up at an alarming rate. As a result of this frenzied population increase, the Mediterranean Sea is rapidly becoming one of the most polluted bodies of water in the world. The French government and its municipalities have generally been reluctant to impose strict controls on development because they fear economic losses. There are exceptions. One law that is considered outstanding pollution legislation is the French law of December 16, 1964. It seeks to establish the administrative machinery necessary to protect surface waters, and calls for a water census which would catalogue the quality of all bodies of surface water in France. It also calls for a system of charges to be levied on those responsible for particular instances of water pollution. The discharge of oil into the oceans and seas is of vital concern to coastal nations. Thus France has ratified the Convention on the Prevention of Pollution of the Sea by Oil. (Ritchie-Florida)
W74-10700

ISRAEL'S VIEW OF HER MARITIME LEGAL PROBLEMS,
M. A. Jacobs.
In: Sea Grant Publication UNC-SG-73-01, p 204-208, March, 1973. 28 ref.

Descriptors: *International law, *Law of the Sea, *Foreign countries, *Jurisdiction, *International waters, Canals, Legal aspects, Foreign trade, Foreign waters, Treaties, United Nations, Governments, Political aspects, Access routes, Navigation, Oceans.
Identifiers: *Israel, *Mediterranean Sea.

The concerted effort of the United Nations and a number of its member states to create an international climate conducive to productive negotiations and enlightened concensus, culminating in a widely-accepted convention, is the most vital current development in the Law of the Sea. Maritime legal problems have played a large part in the hostilities of the last quarter century in the Mideast. The Israeli position is described regarding the Suez Canal, the Straits of Tiran and the Gulf of Aqabe. The etiology of the problem and the rationale for Israel's present positions are discussed. Israel has refused to submit to the compulsory jurisdiction of the International Court of Justice regarding the legality of Egypt's closure of the Suez Canal to Israeli ships in 1948. Israel's answer to Egypt's refusal is that there is no judiciable question, the Egyptian act being an obvious violation of customary international law. While Israel can tolerate the closure of the Suez Canal, the Straits of Tiran are necessary for access to East African, Indian and other lucrative trading markets. (Ritchie-Florida)
W74-10701

THE JAPANESE LEGAL APPROACH TO MARINE POLLUTION,
C. E. Alexander.
In: Sea Grant Publication UNC-SG-73-01, p 209-213, March, 1973. 24 ref.

Descriptors: *Water pollution sources, *Oil pollution, *International law, *Foreign countries, *International waters, Law of the Sea, Jurisdiction, Legal aspects, Foreign trade, Governments, Foreign waters, Treaties, Political aspects, Navigation, Water pollution control, Environment, Environmental effects, Regulations, Control, Water management(Applied), Law enforcement, Management, Ecology, Water policy, Water law.
Identifiers: *Japan.

As an island nation Japan must be particularly concerned with the sea and the dangers of ocean pollution. Like other technologically advanced nations, it has not been concerned with pollution control in the past. Because recognition of the danger of ocean pollution is recent, there has been no development of customary international law on sea pollution. Yet there are international conventions on the matter, to which Japan has been a party, such as the 1954 Convention for the Prevention of Pollution of the Sea by Oil and the Convention on Civil Liability for Oil Pollution. Unfortunately the universal cooperation which Japan hopes for is as yet unrealized, so the Japanese government has resorted to anti-pollution legislation of its own. The purpose of a 1970 law is to prevent marine pollution by controlling the discharge into the ocean of oil and wastes from ships and offshore facilities. By securing appropriate disposal of waste oil and by taking measures for the prevention of marine pollution, Japan contributes to the preservation of the marine environment. (Ritchie-Florida)
W74-10702

THE PEOPLE'S REPUBLIC OF CHINA'S VIEW OF CONTEMPORARY MARITIME LEGAL PROBLEMS,
North Carolina Univ., Chapel Hill.
J. Hugenschmidt.
In: Sea Grant Publication UNC-SG-73-01, p 214-222, March, 1973. 47 ref.

Descriptors: *International law, *Law of the Sea, *Foreign countries, *Jurisdiction, *International waters, Legal aspects, Foreign trade, Governments, Foreign waters, Treaties, Political aspects, Navigation, United Nations, Continental shelf, Commercial fishing, Water law, Asia, Economics.
Identifiers: *Republic of China, *Japan.

Historically, China has been land-oriented philosophically, culturally and economically. Occupations associated with foreign trade were culturally disdained. The clash with the irrepressible force of Western trade and resultant cultural impact required the traditional philosophies to accomodate new economic necessities. China's position on maritime legal problems as an extension of its foreign and domestic policies is analyzed. China's original claim to territorial seas was set at three nautical miles in 1930, but was changed to twelve following the problem in 1958 with the United States and Taiwan regarding the offshore islands of Quemoy and Matsu. Although China has never developed into a maritime power, it has developed its coastal fishing industry. Continued expansion will bring conflicts of interest with neighboring nations who seek to exploit the same seas, particularly Japan. Since 1955, Japan and China have entered into several fisheries agreements. China has a broad continental shelf, but the government has made no definitive policy statements regarding its shelf and its resources. (Ritchie-Florida)
W74-10703

PRIMARY ELEMENTS INFLUENCING THE DEVELOPMENT OF THE LEGAL REGIME OF SOVIET TERRITORIAL WATERS,
E. Zumwalt, III.
In: Sea Grant Publication UNC-SG-73-01, p 223-229, March, 1973. 53 ref.

Descriptors: *International law, *Law of the Sea, *Foreign countries, *Jurisdiction, *International waters, Legal aspects, Foreign trade, Governments, Foreign waters, Treaties, Political aspects, Access routes, Bays, Bodies of water, Navigation, Oceans, Access, Economics.
Identifiers: *USSR.

Although several other factors have influenced the development of the legal regime of Soviet territorial waters, its pattern has primarily been the result of national security requirements, economic considerations, and historical tradition. National security has been the most significant factor. Since all the seas bordering the Soviet Union have narrow entrances, access can be easily restricted by hostile nations. In the past the Soviet Union has dealt with its territorial waters as being under its exclusive jurisdiction. It contended that the only rights that foreign ships had were the rights that the Soviet Union granted. In 1958, the Soviet Union ratified the Convention on the Territorial Sea and Contiguous Zone. The Soviet Union thereby subjected itself to the international norm of permitting innocent passage for foreign ships. The Soviets have developed the 'closed sea' and the 'historic bay' doctrines further to restrict the accessibility of foreign nations to Soviet coasts. The principal legal difficulty with the Soviet position is that Soviets refuse to accept the general applicability of these principles to others bodies of water in the world by other nations. (Ritchie-Florida)
W74-10704

WATER BANK ACT.
Committee on Merchant Marine and Fisheries (U. S. House).

H.R. Rep. No. 1307, 91st Cong, 2d Sess (1970). 16 p.

Descriptors: *Habitat improvement, *Watersheds(Basins), *Land management, *Federal government, *Legislation, Water policy, Water law, Water quality control, Wetlands, Wildlife conservation, Watershed management, Flood control, Migratory birds, Marshes, Land use, Water resources development, Government supports, Regulation, Political aspects, Waterfowl conservation, Water management(Applied).
Identifiers: *Water Bank Act.

The House Committee on Merchant Marine and Fisheries recommended passage of the amended House bill known as the Water Bank Act (H.R. 15770). The general purpose of the bill is to preserve and improve habitat for migratory waterfowl and other wildlife resources. The Act will also contribute to flood control and water quality improvement programs. It would authorize the Secretary of Agriculture to make 10-year agreements with owners and managers of wetlands in migratory waterfowl nesting and breeding areas. The agreements would stipulate that the owners not drain, burn, fill or otherwise destroy the wetland character of the lands under contract nor use such lands for agricultural purposes during the contract period. In return, the owners would receive annual payments from the federal government. The payments would vary but would be greater where the public has access for hunting, fishing, trapping, and hiking. The Secretary would be authorized to expend up to $10 million annually in payments. (Deckert-Florida)
W74-10705

AUTHORIZING THE SECRETARY OF THE INTERIOR TO CONSTRUCT, OPERATE, AND MAINTAIN THE CLOSED BASIN DIVISION OF THE SAN LUIS VALLEY PROJECT, COLORADO.
Committee on Interior and Insular Affairs (U.S. Senate).
Sen. Rep. No. 947, 92d Cong., 2d Sess. (1972). 16 p.

Descriptors: *Colorado, *Water management(Applied), *Groundwater, *Groundwater resources, *Water supply, Groundwater basins, Water resources, Water resources development, Irrigation, Federal project policy, Water utilization, Wildlife, Recreation, Government finance, Legislation, Federal government, Water reuse, Water shortage, Water requirements.
Identifiers: *San Luis Valley(Colo).

This bill would authorize the Secretary of the Interior to construct, operate and maintain the Closed Basin Division of the San Luis Valley Project in Colorado. The Committee on Interior and Insular Affairs reports favorably on the bill with certain recommended amendments. The project works, which are contemplated to be installed in five stages, would consist of shallow wells and conveyance facilities totaling fifty-five miles of channels and ninety-two miles of well field laterals. The project would salvage an average of 108,000 acre feet of groundwater per year. This water surplus would be available for irrigation and other beneficial uses in Colorado. The new Mishak National Wildlife Refuge is proposed to be established as part of the project and would be furnished with a water supply developed by a separate system. The total construction cost of the Closed Basin Division of the multipurpose water resource project is estimated to be in excess of $18,000,000, of which 90% is allocated to water salvage. The Administration proposed that such costs be made reimbursable, but the Committee determined that to be impracticable. Annual costs for operation and maintenance are estimated to be $355,000. (Ritchie-Florida)
W74-10706

THE NEW LAW ON OCEAN DUMPING, STATUTE AND TREATY,
For primary bibliographic entry see Field 5G.
W74-10707

AMENDMENT OF THE OIL POLLUTION ACT, 1961, (15 STAT. 402), (FINAL ENVIRONMENTAL IMPACT STATEMENT).
Coast Guard, Washington, D.C.
For primary bibliographic entry see Field 5G.
W74-10708

THE NATIONAL WATER PERMIT PROGRAM.
Environmental Protection Agency, Washington, D.C. Office of Enforcement and General Counsel.
For primary bibliographic entry see Field 5G.
W74-10709

WATER QUALITY AND OUR FUTURE ENVIRONMENT -- A FEDERATION VIEW,
Duncan, Lagnese, and Associates, Inc., Pittsburgh, Pa.
For primary bibliographic entry see Field 5G.
W74-10710

URBAN CREEKS, A CONDITION OF CRISIS.
Nine-Mile Creek Citizens Committee, Saint Paul, Minn.
For primary bibliographic entry see Field 5G.
W74-10711

IT'S EVERYBODY LAKE,
Michigan Dept. of Natural Resources, Lansing.
For primary bibliographic entry see Field 5G.
W74-10712

SEABED REGIMES AND THE LIMITS OF NATIONAL JURISDICTION,
Miami Univ., Fla. Ocean Law Program.
B. J. Legg.
University of Miami Sea Grant Technical Bulletin, No 19, January 1972. 125 p, 209 ref.

Descriptors: *Continental shelf, *Law of the sea, *Oceans, *International law, Continental slope, Treaties, United Nations, Exploration, Exploitation, Mineralogy, International waters, Jurisdication, Natural resources, Resources development, Legal aspects, Ownership of beds.

Vast deposits of mineral resources important to man exist in the seabed, particularly in the area of the continental shelf. Divergent claims are being made by various nations on the matter of competence to exercise jurisdication over seabed resources. To avoid conflict among nations, proposals have been made for the establishment of a deep seabed regime. Five types of proposals which advocate varying degrees of national or international control are discussed. The five categories are: National Lakes, Res Communis, Flag Nation, United Nations Ownership, and the International Regime. Each of these proposals deal with two essential questions. First, what regime should control exploration and exploitation of seabed resources beyond the limits of national jurisdication. And second, what is the seaward limit of national jurisdication. The three existing interpretations of the width of the continental shelf, the wide shelf interpretation, the narrow shelf interpretation and the intermediate zone concept are discussed. (Flowers-Florida)
W74-10714

REPORT TO THE CONGRESS--WATER POLLUTION ABATEMENT PROGRAM: ASSESSMENT OF FEDERAL AND STATE ENFORCEMENT EFFORTS, ENVIRONMENTAL PROTECTION AGENCY.
Comptroller General of the United States, Washington, D.C.
Report 166506, March 23, 1972. 55 p, 2 append.

Descriptors: *Federal Water Pollution Control Act, *Law enforcement, *Water quality standards, *Federal government, *Adoption of practices, State governments, Governmental interrelations, Water law, Water policy, Water quality control, Governments, Legal aspects, Regulation, Legislation, Rivers and Harbors Act, Florida, Georgia, Indiana, Massachusetts, New Jersey, North Carolina, Administration, Administrative decisions.
Identifiers: Refuse Act of 1899.

In the past both State and Federal efforts to maintain water quality standards had to rely heavily on voluntary compliance rather than enforcement. Since 1970, federal and state programs improved substantially and enforcement actions have been pursued vigorously. While the federal role in enforcement of water quality requirements has expanded, enforcement is still primarily the responsibility of the states. An assessment of federal and state enforcement efforts in Florida, Georgia, Indiana, Massachusetts, New Jersey, and North Carolina indicates that effective enforcement policies should include a close working relationship between the state pollution control agency and the state attorney general's office, and an effective monitoring system to gauge pollution abatement. More cooperation between federal and state control efforts and more efficient enforcement procedures are needed improvements. Legislation to correct these weaknesses is pending in Congress. (Deckert-Florida)
W74-10715

A BILL TO PROVIDE FOR DISASTER ASSISTANCE.
Senate, Washington, D.C.
Sen Bill No 1840, 93d Cong, 1st Sess (1973). 40 p.

Descriptors: *Disasters, *Adoption of practices, *Loans, *Flood plain insurance, *Planning administrative agencies, Water management(Applied), State governments, Economics, Resource allocation credit, Damages, Protection, Compensation, Costs, Federal government, Flood control, Land management, Legislation.

Federal assistance is provided to state and local governments in fulfilling their basic responsibilities for alleviating damage and suffering resulting from disasters. The act is designed to increase coordination of disaster preparedness and assistance programs; to provide federal funds to supplement state and local assistance; to make existing programs more compatible with local needs; to encourage development of comprehensive disaster assistance capabilities; to encourage individuals and state and local governments to obtain insurance coverage; and to encourage hazard mitigation measures. The act is to be administered by the offices of the President and empowers him to direct any federal agency to utilize its resources in support of state and local disaster assistance efforts. Assistance will be provided by using or lending, with or without compensation, equipment, supplies, facilities, personnel, and any other resources; by distributing medicine, food and other consumable supplies; by donating surplus federal equipment and supplies; and by performing services not within the states' capabilities to preserve and protect public health and safety. (Barnes-Florida)
W74-10716

AN ACT AUTHORIZING THE CONSTRUCTION, REPAIR, AND PRESERVATION OF CERTAIN PUBLIC WORKS ON RIVERS AND HARBORS FOR NAVIGATION, FLOOD CONTROL, AND FOR OTHER PURPOSES.
Senate Bill 606, 93d Cong, 1st Sess (1973). 65 p.

Descriptors: *Federal government, *Legislation, *Water resources development, *Project purposes, *Water policy, Navigation, Navigable waters, Structures, Facilities, Planning, Flood

protection, Flood prevention, Administrative agencies, Power plants, Water management, Water quality, Water quality control, Land use, Land development, Land management, Easements, Ecology, Environment, Environmental effects, Fishlife, Wildlife conservation, Wildlife management, Regulations, Standards, Channnels, Pollutants, Disposal, Shores, Shoreline.

Construction, repair and preservation of certain public works on rivers and harbors for navigation, flood control and other purposes are authorized. The Army Corps of Engineers has the duty and responsibility of prosecuting such structures, works and improvements. Hurricane-flood protection and other flood prevention appropriations are authorized as well as certain navigational improvements. The Act further provides for various power installation sites and directs that in development of the several projects, provisions shall be made to assure proper fish and wildlife management, including acquisition of necessary lands or environmental easements. Such easements shall prevent the clearing of the subject land for commercial agricultural purposes or any other purpose inconsistent with wildlife habitat. Also among the provisions are directions to the Corps to remove certain sunken vessels impeding navigation and authorization to clear channels of such trees, roots, debris and other objects which impair safe navigation. The Corps is authorized to operate and maintain models to test proposals affecting the environmental quality of the regions including sanitary intrusion, dispersion of pollutants, water quality, shoreline changes, and others. (Silber-Florida)
W74-10717

POLLUTION CONTROL IN ILLINOIS, THE FORMATIVE YEARS,
Illinois Pollution Control Board, Springfield.
For primary bibliographic entry see Field 5G.
W74-10718

OILY BALLAST DISCHARGE - PROPOSED REQUIREMENTS.
Coast Guard, Washington, D.C.
Federal Register, Vol 38, No 93, p 12749-12750, May 15, 1973.

Descriptors: *Regulation, *Coast guard regulations, *Oil wastes, *Boats, *Water pollution sources, Chemical wastes, Oily water, Waste water disposal, Administrative agency, Standards, United States, Navigation, Oceans, Environmental sanitation, Waste water discharge, Pipelines, Transportation, Waste water pollution, Liquid wastes, Waste disposal.
Identifiers: *Administrative regulations, *Hazardous substances(Pollution), Notice.

The Coast Guard is considering amendments to the oily ballast discharge regulations for all vessels. Interested persons may participate in this proposed rulemaking by submitting data or views. Notice of the proposed rulemaking appeared in the Federal Register February 15, 1973. From comments on the proposal it was obvious that the public was interpreting the amendments as additions to the oil pollution prevention requirements when in fact they were meant to be references to current requirements. In order to correct the misconception of the intent of the regulations, the Coast Guard determined to withdraw the prior proposal, and publish a new proposal that would clearly state the amendment. The amendment covers the operation of tank vessels, of piping systems and appurtenances, and stability, and use of liquid ballast. Regulations are also issued concerning passenger and oceanographic vessels' operations and discharge of liquid ballast. (Sperling-Florida)
W74-10719

CONSENT JUDGEMENTS IN ACTIONS TO ENJOIN DISCHARGES OF POLLUTANTS.
Department of Justice, Washington, D.C.
Federal Register, Vol 38, No 136, p 19029, July 17, 1973.

Descriptors: *Pollutants, *Judicial decisions, *Public access, Pollution discharges, Public rights, Legal aspects, Water law, Pollution abatement, Pollution control, Water quality, Water quality control.
Identifiers: *Injunction.

A policy is established of the Department of Justice of affording an opportunity for public comment before the Department consents to a proposed judgement in an action to enjoin discharges of pollutants into the environment. To accomplish this, each proposed judgement shall be lodged with the court at least thirty days before judgement is entered. Prior to judgment entry, the Department of Justice will receive, consider, and file with the court, any written comments, views, or allegations relating to the proposed judgment. The Justice Department reserves the right to withdraw or withhold its consent to the proposed judgment if it is indicated that the proposed judgment is improper and the Department will oppose an attempt by any person to intervene in the action. The Assistant Attorney General in charge of the Land and Natural Resources Division may establish procedures for implementing this policy. Where the public interest in the policy is not compromised, the Assistant Attorney General may permit an exception to the policy based on extraordinary circumstances. (Proctor-Florida)
W74-10720

MARITIME POLLUTION: THE CANADA SHIPPING ACT AMENDED.
For primary bibliographic entry see Field 5G.
W74-10721

LOCAL INITIATIVE IN POLLUTION CONTROL,
Environmental Protection Agency, Washington, D.C.
For primary bibliographic entry see Field 5G.
W74-10722

A BILL TO PROMOTE COMMERCE AND PROTECT THE ENVIRONMENT BY ESTABLISHING PROCEDURES FOR THE SITING, CONSTRUCTION, AND OPERATION OF DEEP-WATER PORT FACILITIES OFF THE COAST OF THE UNITED STATES, AND FOR OTHER PURPOSES.
Senate Bill 2232, 93d Cong, 1st Sess (1973). 24 p.

Descriptors: *Federal government, *Legislation, *Oceans, *Ports, *Environmental sanitation, Water policy, Water quality, Public health, Water quality control, Pollution control, Pollution prevention, Wildlife, Navigation, Administrative agencies, Structures, Water management, Water development, Water control, Regulation, Standards, Permits, Marine life, Aquatic life, Coasts, Shores.

The promotion of commerce and the protection of the environment by establishing procedures for the siting, construction, and operation of deep-water port facilities off the coast of the United States is proposed. To protect human health and safety, to prevent damage to the marine environment, and to assure uniform standards, a federal regulatory mechanism is needed to oversee the siting, construction and operation of such deepwater port facilities. Coastal zone development, fisheries, wildlife, navigation and the marine environment need to be assured of proper management, regulation and control while these projects are implemented. The Congressional intent is to authorize these facilities while providing for the fullest protection of the maritime and coastal environment to prevent any adverse impact which might occur as a direct or indirect consequence of the development of such facilities. The National Oceanic and Atmospheric Administration shall certify or deny permits to construct such facilities based upon their appraisal of the consideration enumerated above. (Silber-Florida)
W74-10723

A BILL TO EXTEND ON AN INTERIM BASIS THE JURISDICTION OF THE UNITED STATES OVER CERTAIN OCEAN AREAS AND FISH IN ORDER TO PROTECT THE DOMESTIC FISHING INDUSTRY, AND FOR OTHER PURPOSES.
Senate Bill 1988, 93d Cong, 1st Sess (1973). 7 p.

Descriptors: *Federal government, *Legislation, *Boundaries, *Wildlife conservation, *Fisheries, Water law, Legal aspects, International law, Oceans, Sea water, Fishlife, Industry, Management, Development, Regulations, Control, Standards, Marine life, Aquatic life, Environmental effects, Coasts, Continental shelf, International agreements, Jurisdiction.
Identifiers: Coastal waters.

Valuable coastal and anadromous species of fish and marine life off the shores of the United States are in danger of being seriously depleted, and in some cases, of becoming extinct. Foreign fishing efforts beyond the existing 12-mile fisheries zone near the United States coastline are seriously depleting these fishlife stocks. There is danger of irreversible depletion before efforts to achieve an international agreement on jurisdiction over coastal and anadromous fisheries results in an operative agreement. Therefore it is necessary for the United States to take interim action to protect and conserve overfished stocks and to protect the domestic fishing industry. The Interim Fisheries Zone Extension and Management Act would extend the contiguous fisheries zone of the United States in order to provide proper conservation management until general agreement is reached in international negotiations of law of the sea with respect to the size of such zones and authority over such fish. (Silber-Florida)
W74-10724

ANALYSIS OF POLLUTANTS - PROPOSED TEST PROCEDURES.
Environmental Protection Agency, Washington, D.C.
For primary bibliographic entry see Field 5A.
W74-10725

UNITED STATES V. BOYD (PROSECUTION OF SHIP CAPTAIN FOR FAILURE TO REPORT OIL DISCHARGE).
491 F 2d 1163 (9th Cir 1973). 8 p.

Descriptors: *Washington, *Oil pollution, *Oil spills, *Ships, *Water quality, Law enforcement, Harbors, Judicial decisions, Cases, Water law, Water quality control, Water quality Standards, Fuels, Water pollution sources, Federal legislation, Legal aspects, Federal government, Regulation, Oily water, Jetsam, Courts, Water policy.

Appelant, captain of a vessel which discharged approximately thirty gallons of oil into the sea while moored, seeks to overturn a conviction for violation of the Water Quality Improvement Act. Under the act the master of any vessel must report to the appropriate agency any oil spill if that spill causes a film or sheen upon the water and is not from a properly functioning engine. Appellant contends the definition of the minimum amount of oil spilled which must be reported is so vague as to render the statute and its implementing regulations void. The court held that the Congress has the power to give an executive agency the construction of rules which set out what amounts of spillage are de minimis and which are of sufficient size as to require reporting. The rules thus flowing from a congressional mandate are presumed to be valid. Defendant has a heavy burden of proof to contest them. The congressional intent was to

create a strong measure against oil spills and the use of such terms as causing a 'sheen upon or discoloration of the surface of the water' represents adequate description of the types of spills to be reported. Congress intended a rigorous control of oil spills, and the definition here are a valid and adequate implementation of that intent. The conviction is sustained. (Salley-Florida)
W74-10727

STATE V. MCFARREN (ACTION TO REQUIRE LANDOWNER TO REMOVE FILL DEPOSITED IN A NAVIGABLE LAKE).
215 N W 2d 459 (Wis 1974).

Descriptors: *Fill(Earth), *Wisconsin, *Judicial decisions, *Legislation, *Water law, Lake shores, Lakes, Boundaries(Property), Adjacent land owners, Legal aspects, High water mark, Shores, Bulkhead line, Appeals, Law enforcement, Penalties(Legal), Riparian rights, Administrative decisions, Court decisions, Water policy, Water management(Applied), Legal aspects, Adoption of practices.
Identifiers: *Evidence.

The plaintiff state of Wisconsin brought suit to enforce an order by the Department of Natural Resources requiring a landowner to remove fill placed on the bottom of a navigable lake. A State statute forbade placing fill on the floor of navigable lakes beyond the bulkhead line, or shoreline. The defendant argued that at the DNR's hearing the State had failed to show either the existence or non-existence of a bulkhead line, and hence DNR failed to establish a major part of its complaint. The State countered that if the defendant wished to use the non-existence of such a line as a defense, the burden was on the defendant to prove that fact. The court held that the State, with superior access to State charts and legislation, must bear the burden of establishing the existence and location of the bulkhead line before it can prosecute for transgressing that line. A second question involved the applicability of using against the defendant the transcripts of criminal proceedings for the use of fill, where the defendant was found not guilty. The court found the transcript to be unnecessary for the DNR hearing. The Court of Appeals reversed the lower court's dismissal of the DNR's petition for an incomplete record. Since the DNR was attempting to protect a valuable natural resource, it should be given the opportunity to bring the required evidence. The case was remanded for further proceedings. (Salley-Florida)
W74-10728

A BILL TO PROHIBIT COMMERCIAL FISHING IN THE WATERS LOCATED IN THE NATIONAL SEASHORE RECREATION AREAS.
House, Washington, D.C.
H R Rep No 11896, 93d Cong, 1st Sess (1973). 2 p.

Descriptors: *Legislation, *Fishing, *Commercial fishing, *Recreation, *National seashores, Sport fishing, Penalties(Legal), Legal aspects, Water law, Water utilization, Shores, Seashores, Recreation demand, Water policy, International law, Treaties.

Commercial fishing would be prohibited in the waters located in the national seashore recreation areas. Notwithstanding any other law, except as provided in this Act, any person who engages in fishing, other than sport fishing, in any water located within the boundaries of any area administered by the Secretary of the Interior as a national seashore, or as a national seashore recreation area, shall be subject to a fine for each day on which he engages in such fishing. Nothing in this Act shall be construed as being in derogation of any rights of any person to fish in any waters pursuant to any valid treaty or other international agreement entered into by the United States prior to the enactment of this Act. (Ritchie-Florida)
W74-10729

DESCRIPTION OF STATE OF GEORGIA'S PROPOSED NPDES PROGRAM.
For primary bibliographic entry see Field 5G.
W74-10731

MARINE RESOURCES -- A NATIONAL PERSPECTIVE,
National Oceanic and Atmospheric Administration, Washington, D.C. Office of Coastal Environment.
R. W. Knecht.
In: Report of the Governors' Conference on Marine Resources, p 9-10, December 17-18, 1973.

Descriptors: *Coasts, *Natural resources, *Conservation, *Water resources, *Resources development, Resource allocation, Marine biology, Estuaries, Recreation, Industry, Harbors, Federal government, State governments, Planning, Environment, Environmental effects, Ecology, Land use, Water management(Applied).
Identifiers: Coastal waters, Coastal zone management.

The dimensions of marine resource problems as well as the Government's role in marine resources are described. In examining marine resources as a concept, one can identify seven essential elements: living resources, non-living resources, a marine transportation and ports dimension, an industrial dimension, an active recreational dimension, a passive recreational dimension, and potential energy resources. There are six elements in the federal role in marine resources: the resource management role, the role in interstate commerce (navigability), the promotion of environmental quality in the coastal areas, the providing of coastal and marine opportunities nationally, the maintenance of an adequate level of national security through the maintenance of the coastal areas of the country, and the role in encouraging states to implement plans for coastal areas pursuant to the Coastal Zone Management Act of 1972. (Ritchie-Florida)
W74-10732

PLAYING TO WIN IN THE DRAINAGE GAME,
W. G. Peterson.
The Minnesota Volunteer, p 44-49, March-April, 1972. 2 illus.

Descriptors: *Minnesota, *Local governments, *Drainage programs, *Ditches, *Legislation, Drainage practices, Drainage effects, Water policy, Excess water, Drainage, Farm management, Environmental effects, Ecology, Water law, Institutional constraints, Administrative agencies, Surface drainage, State governments.
Identifiers: *Administrative regulations, County board, County administration, State statutes, Water rights(Non-riparians).

The Minnesota Drainage Code, loaded with legal credibility gaps, is stacked against the private landowner. A drainage proceeding highlights the roles of the drainage attorney, drainage engineer, 'viewers', and county board. Their interest in the construction of the ditch makes it difficult for them to independently and objectively evaluate its merits. Those opposing the project are discouraged by late notification of the proposal, by the often poor counsel of the county board attorney, and by burdensom expenses of both opposing the ditch and being assessed for its construction. Rarely does the opposition defeat a drainage ditch proposal. Strenuous use of Minnesota's laws for environmental safeguards should be used to fight ditch construction. A permit must be obtained from the Commissioner of Natural Resources when a proposed ditch will affect public waters. The County board must give due consideration of the natural resources affected. Compensation must be paid to the state if the ditch must be constructed despite it being injurious to state conservation lands. Due regard must be paid to the Environmental Rights Act (1971). (Dillingham-Florida)
W74-10733

A GAME PLAN FOR WATER RESOURCES,
Minnesota Dept. of Natural Resources, Saint Paul.
A. D. Chelseth.
The Minnesota Volunteer, p 30-32, January-February, 1973.

Descriptors: *Minnesota, *Administrative agencies, *Water allocation(Policy), *Water resources development, *Water Resources Planning Act, State governments, State jurisdiction, Federal government, Governmental interrelations, Legislation, Water policy, Environmental effects, Water law, Planning, Comprehensive planning, Coordination, Management, Regional development, Research and development, River basin development, Mississippi River basin, Interstate commissions, River systems, Water management(Applied).
Identifiers: *Administrative regulations, *State policy.

Until recently state governments had not developed a water resource planning capability to effectively represent their interests. Minnesota also lacked definitive policies and coordinated state agencies responsible for water resources. In 1965 Congress passed the Water Resources Planning Act (P.L. 89-80) and this situation changed. The Act authorized the creation of a federal-state river basin commission, whose functions were to plan for water resources management on a multi-state, regional basis. Initial coordinating of Minnesota's resource planning was undertaken by the Water Resource Coordinating Committee (WRCC), formed in May 1967. This function will be assumed by the Minnesota Water Resources Council which will coordinate the planning function amongst all state agencies. Primary responsibility for planning will rest with the Bureau of Planning in the Department of Natural Resources (DNR). The DNR will be responsible for collecting water resources data, establishing a central data bank, and inventorying major federal and local goals and proposals for programs affecting the state's water resources. These proposals will be evaluated and reviewed by the legislature. It is necessary to formulate a concise meaningful state policy notwithstanding the difficulty of balancing conflicting interests. (Dillingham-Florida)
W74-10734

(DEATH OF A POND. DEATH OF A RIVER. THE SOUND AND FURY).
For primary bibliographic entry see Field 5G.
W74-10735

UNITED STATES V. 295.90 ACRES OF LAND (EMINENT DOMAIN PROCEEDING INVOLVING MEANDER LINE).
368 F. Supp. 1301-1311 (M.D. Fla. 1974). 11 p,

Descriptors: *Boundary disputes, *Meanders, *Boundaries(Property), *Land tenure, *Florida, Accretion(Legal aspects), Eminent domain, Legal aspects, Judicial decisions, Water law, Government, Patents, Federal government, Real property, Court decisions, Water policy, Land management.
Identifiers: Evidence.

The government instituted an eminent domain proceeding to acquire certain lands on Sanibel Island. A dispute arose over title to some of the land being sought. The disputed parcel was located beyond an erroneous meander line boundary in the original government patent. The claimants argued that they held title based on the rule that land patented with reference to an official survey showing meander lines includes a right to excess land as yet unapportioned. The government claimed an exception to this rule should apply. Where a meander line is shown to be a gross error

tantamount to fraud, any land beyond the meander line is to be treated as unsurveyed land, title to which remains vested with the government. Considering the size of the parcel involved, the intent of the surveyor, and the nature and value of the subject land relative to other conditions surrounding the disputed survey, the District Court held that the exception to the rule should not apply. The court further held that the rule applied even in the absence of proof that a clearly defined body of water exists or previously existed. (Deckert-Florida)
W74-10736

A BILL TO AUTHORIZE PROVISIONS OF THE INTERNATIONAL BOUNDARY AND WATER COMMISSION.
House, Washington, D.C.
H.R. Rep. No. 12834, 93d Cong, 2d Sess (1974). 6 p.

Descriptors: *Legislation, *Colorado River, *Mexican Water Treaty, *Saline water, *Colorado River basin, Desalination, Mexico, Rivers, Irrigation, Drainage, Water users, Inter-agency cooperation, Federal project policy, United States, Drainage areas, Drainage programs, Land management, Water utilization, Treaties, Federal government.

This bill would authorize the measures necessary to carry out the provisions of the International Boundary and Water Commission, concluded pursuant to the Water Treaty of 1944 with Mexico, which deal with the salinity of the Colorado River. The bill authorizes the construction, operation and maintenance of a desalting complex, including a desalting plant and a bypass drain for the discharge of the reject stream from the plant. Appropriate federal agencies must also accelerate cooperative management programs with the Wellton-Mohawk Irrigation and Drainage District. The purpose is to reduce saline drainage flows by improving irrigation efficiency. These agencies are also directed to assist water users in the Wellton-Mohawk District in installing onfarm systems as a means of reducing saline drainage through more efficient irrigation. The Secretary of State, in conjunction with other federal officials and departments, is authorized to acquire lands deemed necessary to implement the Act, which may be cited as the 'International Salinity Control Project, Colorado River'. (Ritchie-Florida)
W74-10737

ECONOMIC IMPLICATIONS OF WATER POLLUTION ABATEMENT IN FAMILY FARM LIVESTOCK PRODUCTION,
Economic Research Service, Urbana, Ill. Farm Production Economics Div.
R. N. Van Arsdall, and J. B. Johnson.
Report ERS-508, December 1972. 44 p, 3 fig, 27 tab.

Descriptors: *Pollution abatement, *Livestock wastes, *Agricultural runoff, *Economic feasibility, *Farm wastes, Legal aspects, Water pollution, Agricultural wastes, Water pollution sources, Farms, Farm units, Farm practices, Legislation, Judicial decisions, Farm management, Waste treatment, Wastes, Illinois, Northeast U.S., Water pollution sources, Environmental effects.
Identifiers: Nuisance(Legal).

The effect of water pollution abatement litigation and legislation on livestock farming in Illinois is discussed. Since family farmers usually have their homes and business together, a high quality environment is important to them, but impediments to change exist such as uncertainty and lack of knowledge regarding alternative pollution abatement systems and environmental quality standards. Lack of economic incentive to change and diseconomies of size make transition to newer technological developments unfeasible and technical assistance is not generally available. Construction and maintenance of pollution abatement facilities, required by existing and pending legislation, will be greatly affected by availability of credit, cost-sharing assistance and tax regulations. The livestock industry has not imposed environmental quality standards because of the lack of economic incentives. Recent cases have held livestock producers, whose effluent flows into streams, to be guilty of a nuisance. A summary of state water pollution statutes that apply to livestock production in the Northeast and North Central regions of the United States is included. (Barnes-Florida)
W74-10738

PROCEEDINGS OF MEETING ON ENVIRONMENTAL POLLUTION (3RD) HELD AT FORT MCNAIR ON 17-18 MAY 1972, SPONSORED BY AMERICAN ORDNANCE ASSOCIATION.
Edgewood Arsenal, Aberdeen Proving Ground, Md.
For primary bibliographic entry see Field 5G.
W74-10765

THE MILITARY ATTACKS POLLUTION,
Office of the Deputy Assistant Secretary for Defense for Environmental Quality, Washington, D.C.
For primary bibliographic entry see Field 5G.
W74-10766

THE ARMY, ITS MILITARY ACTIVITIES, AND THE ENVIRONMENT DURING 1970,
Deputy Chief of Staff for Logistics (Army), Washington, D.C.
For primary bibliographic entry see Field 5G.
W74-10767

ENVIRONMENTAL LEGISLATION AND THE AIR FORCE,
Environmental Protection Agency, Washington, D.C.
For primary bibliographic entry see Field 5G.
W74-10768

NAVAL ENVIRONMENTAL PROTECTION PROGRAM,
Office of the Chief of Naval Operations, Washington, D.C. Environmental Protection Div.
For primary bibliographic entry see Field 5G.
W74-10769

MARITIME ADMINISTRATION POLLUTION ABATEMENT PROGRAM,
Maritime Administration, Washington, D.C., Office of Ship Construction.
For primary bibliographic entry see Field 5G.
W74-10770

ROLE OF COAST GUARD IN POLLUTION CONTROL,
Coast Guard, Washington, D.C. Office of Marine Environment and Systems.
For primary bibliographic entry see Field 5G.
W74-10771

OIL SPILLS, HAZARDOUS MATERIALS SPILLS, VESSEL PROTECTION, AND OCEAN DUMPING,
Edison Water Quality Lab., N.J.
For primary bibliographic entry see Field 5G.
W74-10772

RESEARCH AND DEVELOPMENT ON PREVENTION OF POLLUTION OF THE SEAS BY OIL AND OTHER POLLUTANTS,
Maritime Administration, Washington, D.C. Office of Research and Development.
For primary bibliographic entry see Field 5G.
W74-10774

REFUSE ACT PERMIT PROGRAM,
Environmental Protection Agency, Washington, D.C. Office of Refuse Act Programs.
For primary bibliographic entry see Field 5G.
W74-10776

U.S. ARMY ENVIRONMENTAL QUALITY RESEARCH AND DEVELOPMENT PROGRAMS,
Army Research Office, Arlington, Va. Life Sciences Div.
For primary bibliographic entry see Field 5G.
W74-10779

AIR FORCE ENVIRONMENTAL RESEARCH AND DEVELOPMENT PROGRAM,
For primary bibliographic entry see Field 5G.
W74-10780

POWER PLANT SITING PROGRAM,
Maryland Dept. of Natural Resources, Annapolis.
For primary bibliographic entry see Field 5G.
W74-10783

LIABILITY FOR HARM FROM UNDERGROUND WASTE DISPOSAL,
Wyoming Univ., Laramie.
For primary bibliographic entry see Field 5B.
W74-10870

REGULATION OF SUBSURFACE DISPOSAL IN TEXAS,
Texas Water Development Board, Austin.
For primary bibliographic entry see Field 5B.
W74-10871

OREGON'S SUBMERGED AND SUBMERSIBLE LANDS.
Oregon Advisory Committee to the State Land Board, Salem.
November 15, 1970. 172 p, 6 append, 18 photo, 1 map, 110 ref. OWRR C-2177(No 3378)(2).

Descriptors: *Oregon, *Beds, *Planning, *Ownership of beds, *Riparian rights, Water law, Boundaries(Property), Navigation, Navigable waters, Industries, Recreation, Estuaries, Legislation, Streams, Streambeds, Easements, Fisheries, Accretion(Legal aspects), Avulsion, Public rights, Zoning, Inland waterways.

The project was designed to investigate Oregon's claims to the submerged and submersible lands of its navigable waterways, and to seek solutions to conflicting claims of ownership by private individuals, political subdivisions and industrial groups who are riparian owners on Oregon's navigable waterways. Described are the history of Oregon's acquisition and disposal of its submerged and submersible lands, use of its navigable waterways, the shifting of beds of navigable streams, and the conflicting claims of ownership between the state and various riparian owners. Problems relating to navigation in fields not pre-empted by the federal government, public easements to a common fishery on submersible land conveyed to private ownership, and industrial and recreational uses in Oregon's estuarine resources are also examined. Legislative recommendations are made which hopefully will provide potential solutions to the conflicts and problems encountered. (See also W74-08516) (Ritchie-Florida)
W74-10874

TO AMEND THE WILD AND SCENIC RIVERS ACT.
Committee on Interior and Insular Affairs (U.S. Senate).
Sen. Bill No 921, 93d Cong, 1st Sess (1973). 4 p.

Descriptors: *Wild Rivers Act, *Rivers, *Wild rivers, *Legislation, *Conservation, *Scenery, Aesthetics, Environment, Water policy, Water law, Federal government, Surface waters, Inland waterways, Natural resources, Resources development, River basin development, Land use, Water utilization, Costs, Project planning, Government finance, Environmental effects.

The Secretary of the Interior or the Secretary of Agriculture, or both jointly, shall submit to the President reports on the suitability for addition to the national wild and scenic rivers system of rivers which are designated by the Congress as potential additions to such system. The President shall report to the Congress his recommendations and proposals with respect to the designation of each such river within three complete fiscal years. Priority shall be given to those rivers with respect to which there is the greatest likelihood of developments which, if undertaken, would render the rivers unsuitable for inclusion within the system. Each report shall show the area included within the report, the characteristics which make the area a worthy addition to the system, the current status of land ownership and use in the area and the reasonably foreseeable potential uses of the land and water which would be enhanced if the area were included within the system. Each report shall also estimate the cost to the United States of acquiring and administering the area. (Ritchie-Florida)
W74-10875

AMENDED BILL: IMPLEMENTATION OF CONVENTION ON THE PREVENTION OF MARINE POLLUTION BY DUMPING WASTES AND OTHER MATTER.
Committee on Merchant Marine and Fisheries (U.S. House).
H.R. Bill No 5450, 93d Cong, 1st Sess, (1973). 5 p.

Descriptors: *Legislation, *Marine biology, *Environment, *Environmental effects, *Water pollution, Water pollution sources, Permits, Waste disposal, Oil, Wastes, Nuclear wastes, Radioactive wastes, Chemical wastes, Ships, Biological warfare, Environmental control, International law, International waters.

This bill would amend the Marine Protection, Research, and Sanctuaries Act of 1972, in order to implement the provisions of the Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter. Proposed changes include alterations of the definitions of 'material' and 'oil', and the prohibition of loading by any vessel registered in the United States of any radiological, chemical or biological warfare agent, except as may be authorized in a permit, if such loading occurs in the territory of any foreign state not a contracting party to the convention. Except in relation to dredged material, and radiological, chemical and biological warfare agents, permits may be issued where it is determined that dumping will not unreasonably degrade or endanger human health or the marine environment. It is the policy of the Congress that the President shall undertake to seek effective international action and cooperation to ensure that all parties to the convention shall carry out their requirements and obligations under the convention. (Ritchie-Florida)
W74-10876

DEEPWATER PORTS.
H.R. Report No 668, 93d Cong, 1st Sess (1973). 15 p.

Descriptors: *Oil, *Oil industry, *Legislation, *Harbors, *Environmental effects, Excavation, Government finance, Environment, Ecology, Planning, Navigation, Ships, Oil spills, Water pollution, Water pollution sources, Water pollution control, Water quality, Energy, Oil pollution, Import.
Identifiers: *Deepwater ports.

The United States presently faces the possibility of a long-term energy shortage unless steps are taken to conserve the energy available, develop new sources of energy, and attain self-sufficiency in energy. Importation of significant amounts of crude oil and petroleum products is nevertheless expected to continue. If the crude oil and petroleum products are to be imported efficiently and economically, it is necessary that deepwater port facilities be constructed which can accommodate the very large cargo carriers. Alternative solutions would involve higher economic and possibly environmental costs. No other aspect of the import of bulk commodities ranks with the danger of petroleum spills as a source of environmental and ecological damage. The danger of the uncontrolled release of petroleum into the environment arises primarily from accidental collisions, transfer of petroleum from vessels to storage tanks and the possibility of leakage from the tanks themselves. There is no evidence that supertankers present a greater risk than do smaller ships, since the size of a spill can be controlled irrespective of ship size. (Ritchie-Florida)
W74-10877

THE PROBLEM OF OCEANIC RESEARCH: UNITED STATES AND LATIN AMERICAN PERSPECTIVES,
North Carolina Univ., Chapel Hill. School of Law.
J. E. Kilpatrick.
In: Current Aspects of Sea Law, Sea Grant Publication UNC-SG-74-03, p 35-41, March, 1974. 13 ref.

Descriptors: *International law, *Law of the Sea, *Oceans, *International waters, United States, Foreign waters, Research and development, Scientific personnel, Legal aspects, Political aspects, Data collections, Marine biology, Public benefits, Oceanography, Water law, *South America.

One of the complex topics to be resolved by the upcoming Law of the Sea Conference is the status of marine scientific research. For developed nations, the issue is to what protection under international law should marine scientists be entitled, in view of their special research requirements and its benefits to mankind. For developing nations, the issue is what regulation by coastal states of scientific research is necessary to protect and promote special national interests in adjacent ocean areas. The political and legal conflicts underlying these differing approaches, as reflected in the specific declarations or draft treaty articles of the United States and the Latin American countries are examined. The United States, with support from other developed nations such as the Soviet Union, has vigorously defended the freedom of marine research, premised on a recognition of the rising importance of marine research for mankind in general. Recent Law of the Sea declarations by Latin American countries reflect a dominant concern for national sovereignty and economic development. (Ritchie-Florida)
W74-10878

THE JUBILEE OF THE ROYAL COMMISSION STANDARD,
East Suffolk and Norfolk River Authority (England).
For primary bibliographic entry see Field 5G.
W74-10891

WATER LAWS IN USSR,
Himachal Pradesh State Electricity Board, Simla (India).
For primary bibliographic entry see Field 5G.
W74-10893

RIVERS POLLUTION SURVEY IN SCOTLAND IN RETROSPECT AND PROSPECT,
Secretary of State for Scotland, Edinburgh. Scottish Development Dept.
For primary bibliographic entry see Field 5G.
W74-10896

IS THE WATER SAFE TO DRINK. PART I: THE PROBLEM,
Environmental Defense Fund, Washington, D.C. Water Resources Program.
For primary bibliographic entry see Field 5F.
W74-10897

6F. Nonstructural Alternatives

MINNESOTA FLOODS, 1972--COSTS, PROGRAMS AND POLICY IMPLICATIONS,
Minnesota Univ., Minneapolis. Dept. of Agricultural and Applied Economics.
A. R. Hopeman.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-234 352, $7.25 in paper copy, $2.25 in microfiche. Minnesota Dept. of Natural Resources, St. Paul, Bulletin June 1973. 71 p, 1 fig, 8 tab, 22 ref. OWRR B-054-MINN(2).

Descriptors: *Flood damage, *Flood plains, Management, *Costs, *Flood plain insurance, *Minnesota, Water policy, Land use, Human population, Community development.
Identifiers: Social costs.

The costs of flooding in Minnesota are explored with an eye to determining the incidence of the cost of flooding, i.e., who pays flood costs. The study is predicated on the assertion that the incidence of flood costs has a direct bearing on settlement patterns in flood plain areas. Settlement patterns in turn, have a direct bearing upon the magnitude of flood losses. A major objective is to examine public flood policy in light of the 1972 flood experience in Minnesota, and to suggest ways in which Minnesota's flood plain lands can be put to better use. This is to be done by narrowing the divergence between the private costs and social costs of using flood plain land. Since social costs of flooding are frequently not taken into account when private locational decisions are made, flood plain lands will be put to better use if these social costs are minimized. (Walton-Minnesota)
W74-10417

ECONOMICS OF LAND USE REGULATION IN FLOOD HAZARD AREAS,
Minnesota Univ., St. Paul. Agriculture Extension Service.
A. R. Hopeman.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-234 425, $4.00 in paper copy, $2.25 microfiche. Agricultural Extension Service, Univ. of Minn. August 1973. Minnesota Agricultural Economist. No 548, p 1-5, 2 fig, 1 tab. OWRR B-054-MINN(3). 14-31-0001-3601.

Descriptors: Floods, *Costs, Management, *Flood plains, *Minnesota, *Land use, *Regulation, Economics, *Flood control, Institutional constraints.
Identifiers: Flood costs, Social costs, *Flood hazard areas.

To put flood plain lands to their wisest use, a balanced governmental approach is required. Controls are needed so flood plain land is not used in ways that impose external costs on upstream or downstream users. Institutional modifications are needed to induce flood plain occupants to consider the social costs of their locations. Where institutional modification are unfeasible or inadequate, further regulation is in order. Aggressive information dissemination should inform flood plain purchasers about flood hazards. Regulation may be necessary so prospective purchasers are not at the mercy of unscrupulous or uninformed developers. Structural measures may be warranted

in some areas. However, proposals should be evaluated cautiously. Such proposals should be subject to new constraints. Beneficiaries of structural protection works should pay more of the cost. Structural protection works should be combined with land regulation schemes so that the works do not encourage unwise land use. Structural protection works should be used to protect properties having a sound economic reason for being located in flood plain areas. Other land use should be redirected to nonhazardous locations. (Walton-Minnesota)
W74-10529

FLOOD PLAIN INFORMATION--PETERS CREEK, BIRCHWOOD, ALASKA,
Corps of Engineers, Anchorage, Alaska.
For primary bibliographic entry see Field 4A.
W74-10684

PRACTICES IN DETENTION OF URBAN STORMWATER RUNOFF,
Poertner (Herbert G.), Bolingbrook, Ill.
For primary bibliographic entry see Field 4A.
W74-10696

6G. Ecologic Impact Of Water Development

TECHNICAL BASIS FOR INTERIM REGIONAL TORNADO CRITERIA,
Atomic Energy Commission, Washington, D.C. Office of Regulation.
For primary bibliographic entry see Field 2B.
W74-10433

RHODE ISLAND'S OCEAN SANDS: MANAGEMENT GUIDELINES FOR SAND AND GRAVEL EXTRACTION IN STATE WATERS,
Rhode Island Univ., Kingston. Coastal Resources Center.
For primary bibliographic entry see Field 5G.
W74-10437

DREDGING AND SPOILING ON LONG ISLAND,
State Univ. of New York, Stony Brook. Marine Sciences Research Center.
For primary bibliographic entry see Field 5C.
W74-10439

PALM BEACH COUNTY SEWAGE IMPROVEMENT PROGRAM FLORIDA (FINAL ENVIRONMENTAL STATEMENT).
Environmental Protection Agency, Atlanta, Ga.
For primary bibliographic entry see Field 5D.
W74-10514

SIERRA CLUB V. MASON (MOTION TO VACATE INJUNCTION BARRING HARBOR DREDGING PROJECT).
For primary bibliographic entry see Field 6E.
W74-10522

HARRY S. TRUMAN DAM AND RESERVOIR, OSAGE RIVER, MISSOURI, APPENDIX C, (FINAL ENVIRONMENTAL STATEMENT).
Army Engineers District, Kansas City, Mo.
For primary bibliographic entry see Field 4A.
W74-10523

ENVIRONMENT IMPACT REQUIREMENTS IN THE STATES: NEPA'S OFFSPRING,
Center for California Public Affairs, Claremont.
For primary bibliographic entry see Field 6E.
W74-10527

A METHODOLOGY FOR POWER PLANT SITE SELECTION AT THE RECONNAISSANCE LEVEL,
Long Island Lighting Co., Mineola, N.Y. Environmental Engineering Dept.
M. C. Cordaro, and W. T. Malloy.
Journal of Environmental Systems, Vol 3, No 4, p 257-266, Winter 1973. 1 fig, 6 tab.

Descriptors: *Powerplants, *Sites, *Evaluation, Cooling, *Decision making, *Methodology, Costs, Sea water, Shores, Water resources, Analysis, *New York, Risks.
Identifiers: *Long Island, Judgment, Rating, Screening.

A methodology was developed and applied to identify the principal candidate sites for locating major steam electric generating facilities to serve Long Island. The selection criteria included not only economic and engineering considerations but also social and environmental factors reflecting changing and often intangible public values. The choice of cooling medium for Long Island power plants was seawater; the high cost of piping and the associated environmental impact of inland siting restricted acceptable site choices to near-shore locations. From a total of 68 candidate sites, five sites most suitable for further detailed investigations were selected utilizing a series of steps in which analysis and judgment were combined to overcome the problems of preliminary information and uncertainty: (1) qualification review; (2) preference review; and (3) recommendation review. Unsuitable sites were eliminated on the basis of steps 1 and 2. A refined analysis of the favorable sites revealed patterns of value-free dominance among them. (Bell-Cornell)
W74-10602

PUBLIC WORKS FOR WATER AND POWEER DEVELOPMENT AND ATOMIC ENERGY COMMISSION APPROPRIATION BILL, 1975, PART I, PART II.
For primary bibliographic entry see Field 6E.
W74-10697

AMENDMENT OF THE OIL POLLUTION ACT, 1961, (15 STAT. 402), (FINAL ENVIRONMENTAL IMPACT STATEMENT).
Coast Guard, Washington, D.C.
For primary bibliographic entry see Field 5G.
W74-10708

A GAME PLAN FOR WATER RESOURCES,
Minnesota Dept. of Natural Resources, Saint Paul.
For primary bibliographic entry see Field 6E.
W74-10734

SOME ENVIRONMENTAL CONSIDERATIONS IN POWER GENERATION,
Burns and Roe, Inc., Oradell, N.J.
For primary bibliographic entry see Field 5G.
W74-10782

POWER PLANT SITING PROGRAM,
Maryland Dept. of Natural Resources, Annapolis.
For primary bibliographic entry see Field 5G.
W74-10783

TO AMEND THE WILD AND SCENIC RIVERS ACT.
Committee on Interior and Insular Affairs (U.S. Senate).
For primary bibliographic entry see Field 6E.
W74-10875

DEEPWATER PORTS.
For primary bibliographic entry see Field 6E.
W74-10877

ENVIRONMENTAL INFLUENCES ON OFFSHORE FACILITIES,
National Oceanic and Atmospheric Administration, Washington, D.C. Environmental Data Service.
A. R. Hull, and T. S. Austin.
Marine Technology Society Journal, Vol 8, No 4, p 15-21, April-May, 1974. 6 fig, 6 ref.

Descriptors: *Environmental effects, *On-site data collections, *Harbors, *Offshore platforms, *Data collections, Nuclear powerplants, *History.
Identifiers: *Deep water ports.

Environmental data will play a very important role in the planning, site selection, design, construction, and operation of offshore facilities including deep water ports for supertankers. Because of the increasing necessity of energy importation, the United States will be developing three types of offshore facilities: nuclear powerplants, drilling rigs, and supertanker terminals (deep water ports). The specific types of data needed during each phase of development of these facilities, especially deep water ports, are discussed. Some of the categories reviewed included: distance offshore of suitable water depth; storm surge; extreme wave-wind conditions; and severe storm frequency. Cost effectiveness versus protection of the environment is discussed. The availability of historical environmental data from national centers and the need for subsequent on-site observations are examined. Two recent data guidelines developed for potential supertanker ports are reviewed, and the need for more detailed studies is cited. (Shaffer-FIRL)
W74-10898

7. RESOURCES DATA

7A. Network Design

RELIABILITY OF SNOWMELT RUNOFF PREDICTIONS BASED ON MASS BALANCE PROCEDURES VERSUS INDEX METHODS,
Wyoming Univ., Laramie. Water Resources Research Inst.
For primary bibliographic entry see Field 2C.
W74-10536

THE DESIGN OF SAMPLING PROGRAMMES FOR RIVERS AND EFFLUENTS,
Water Pollution Research Lab., Stevenage (England).
H. A. C. Montgomery, and I. C. Hart.
Water Pollution Control, Vol 78, No 1, p 77-101, 1974. 7 fig, 7 tab, 39 ref.

Descriptors: *Sampling, *Rivers, *Effluents, *Water sampling, Time, Flow, Water treatment, Water quality, Water analysis, Methodology, Surveys, Numerical analysis, Mixing, Formulas.
Identifiers: *United Kingdom.

Guidelines for the design of sampling programs for rivers and effluents are discussed based upon a survey of conditions in the United Kingdom. In developing a program, it is advisable to seek various types of average, percentile values, or frequency distribution of concentration or load, as well as individual dual values or sequences of values. Loads and flow weighted concentrations tend to become more useful than time based average concentrations as the flow becomes more variable. Accidental or illegal incidents of short duration cannot be detected with certainty by long term sampling programs. Sampling should be carried out only where lateral or vertical mixing is complete and sampling locations should be numerous enough to allow the results to be interpreted in the manner decided upon. Six samples are tentatively suggested as an appropriate number of characterizing a cyclic fluctuation or a period of persistently high or low concentration. Time of

sampling should either be randomized or arranged so that the frequency of sampling is different from that of any daily, weekly, or other cyclic fluctuation. Formulae are proposed for estimating the number of samples needed to obtain a summary result with a given precision at a given level of confidence. (Merritt-FIRL)
W74-10576

SURFACE WATER SYSTEM -- 1973,
Wyoming Univ., Laramie. Water Resources Research Inst.
For primary bibliographic entry see Field 7C.
W74-10695

7B. Data Acquition

A RAPID AND ACCURATE METHOD FOR THE ANALYSIS OF CALCIUM CARBONATE IN SMALL SAMPLES,
Amherst Coll., Mass. Dept. of Geology.
For primary bibliographic entry see Field 2J.
W74-10366

A SETTLING TUBE SYSTEM FOR SAND-SIZE ANALYSIS,
Northwestern Univ., Evanston. Dept. of Geological Sciences.
For primary bibliographic entry see Field 2J.
W74-10367

AN INVESTIGATION OF ELECTRO-OPTICAL TECHNIQUES FOR THE ANALYSIS OF SUSPENDED SEDIMENTS,
Delaware Univ., Newark. Coll. of Marine Studies.
For primary bibliographic entry see Field 2J.
W74-10407

MEASUREMENTS OF THE DISTRIBUTION AND VOLUME OF SEA-SURFACE OIL SPILLS USING MULTIFREQUENCY MICROWAVE RADIOMETRY,
Hulbert (E.O) Center for Space Research, Washington, D.C. Space Sciences Div.
For primary bibliographic entry see Field 5B.
W74-10429

INTERPRETATION OF LAND USE AND STREAM ORDER, PAWNEE RIVER BASIN, KANSAS.
Kansas Univ. Center for Research, Inc., Lawrence.
For primary bibliographic entry see Field 4A.
W74-10430

ADVANCED X-RAY CRAWLER.
For primary bibliographic entry see Field 8C.
W74-10450

COMPUTERISED SEWERAGE SCHEME.
For primary bibliographic entry see Field 5D.
W74-10476

SAMPLING AND FLOW MEASURING DEVICE,
P. D. Dieterich.
U.S. Patent 3,803,921. Issued April 16, 1974. Official Gazette of the U.S. Patent Office, Vol 921, No 3, p 943, April 16, 1974. 1 fig.

Descriptors: *Patents, *Pipes, Analytical techniques, *Water sampling, Pollutant identification, Flow, Measurement, Instrumentation.

A device is described for sampling the fluid flow in a pipe. It is comprised of a probe extending into the flow system. The probe has an outer conduit of blind inner and outer ends extending diametrically across the pipe and having a plurality of laterally spaced openings facing the flow. It also has an inner conduit extending from exterior of the pipe to the axial center of the outer conduit from one end. This provides the sole communication from the interior of the outer conduit to sample gathering means external of the pipe. The lateral openings sample the stream of fluid at several areas across the diameter of the pipe, carrying the respective samples into the interior of the outer conduit which constitutes a mixing plenum, so that a representative sample is drawn off from the inner conduit. Instead of drawing the sample off, the sample is passed through a flow sensor and then returned to the pipe to measure the rate of flow of the fluid. (Murphy-FIRL)
W74-10484

FLUID POLLUTION MONITORING APPARATUS AND METHOD,
For primary bibliographic entry see Field 5A.
W74-10485

MICROBIOLOGICAL WATER SAMPLERS, (IN RUSSIAN),
Akademiya Nauk SSSR, Moscow. Institut Biologii Vnutrennykh Vod.
A. K. Stolbunov.
Gidrobiol Zh Vol 8, No 5, p 112-118, 1972, Illus.
Identifiers: *Microbiological samples, *Water sampling, Design, *Sampling.

A design is presented for 4 microbiological water samplers which guarantee sterile collection of 1, 2, 3 or a series of water samples from any rigorously prescribed depth with a single lowering.--Copyright 1973, Biological Abstracts, Inc.
W74-10517

APPLICATION OF GROUNDWATER HYDRAULICS TO A BASALTIC WATER-TABLE AQUIFER,
Central Groundwater Board, Nagpur (India).
For primary bibliographic entry see Field 4B.
W74-10569

SENSING OF MOISTURE CONTENT IN SOIL,
Wescor, Inc., Logan, Utah.
For primary bibliographic entry see Field 2G.
W74-10592

ON THE THERMOELECTRIC MEASUREMENT OF WATER TRANSFER IN PLANT STEMS,
For primary bibliographic entry see Field 2I.
W74-10601

COLLECTION AND ANALYSIS OF REMOTELY SENSED DATA FROM THE RHODE RIVER ESTUARY WATERSHED,
Smithsonian Institution, Edgewater, Md. Chesapeake Bay Center for Environmental Studies.
For primary bibliographic entry see Field 2L.
W74-10622

COMPUTER ANALYSIS FOR ACOUSTIC SENSING OF MULTILAYER SEDIMENTS,
New Hampshire Univ., Durham. Dept. of Mechanical Engineering.
For primary bibliographic entry see Field 2J.
W74-10637

APPLICATION OF GEOPHYSICAL METHODS IN THE INVESTIGATION OF MINERAL AND THERMAL WATERS,
Institute for Geological and Geophysical Research, Belgrade (Yugoslavia).
For primary bibliographic entry see Field 4B.
W74-10645

PHOTO-HYDROLOGICAL RECONNAISSANCE SURVEYS,
International Inst. for Aerial Survey and Earth Sciences, Enschede (Netherlands).
A. M. J. Meijerink.
March 1974. 371 p.

Descriptors: *Aerial photography, *Hydrogeology, *Water storage, *Surveys, *Terrain analysis, Remote sensing, Mapping, Photogrammetry, Water resources, Investigations, Data collections.
Identifiers: *India, *Netherlands.

The application of aerial photographic interpretation to regional hydrologic surveys in data-scarce areas was studied with emphasis on warm, nonhumid climates. The first objective is to arrive at an insight of the nature of the surface- and subsurface hydrological processes within each part of any given area. The second objective is to make an approximate estimate of the relative quantities of locally available water resources. The third objective is to indicate where sediment affects the feasibility of surface storage of water. A fourth objective is the planning of an efficient project hydrological network. The storage concept offers a way of evaluating the influence of landscape features on hydrological processes, and allows the incorporation of the effects of the seasonal variations in meteorological factors. (Knapp-USGS)
W74-10648

EVALUATION OF A HOLLOW SPHERICAL CAVITY WITH A CIRCULAR APERTURE AS A REMOTE SENSOR OF ATMOSPHERIC INDEX OF REFRACTION,
Texas Univ., Austin. Antennas and Propagation Lab.
J. D. Brett, and A. H. LaGrone.
Available from NTIS, Springfield, Va. 22161 as COM-73-11927, Price $2.75 printed copy; $2.25 microfiche. Report No P-53, May 31, 1973. 47 p, 8 fig, 9 ref.

Descriptors: *Remote sensing, *Optical properties, *Air pollution, *Refractivity, Instrumentation, Research and development, *Pollutant identification.

Remote measuring of the index of refraction of the atmosphere was studied using the resonance characteristics of a hollow spherical cavity with apertures. The theoretical study assumed a closed cavity and produced a Q with a bandwidth narrow enough to enable the detection of a change in the index of refraction of the gas filling the cavity of approximately 35 N units. The experimental study produced a minimum detectable change of approximately 320 N units. To produce a feasible system for measuring the index of refraction of the atmosphere a minimum detectable change of no more than 1 N unit would be required. The sensitivity of the proposed system using a hollow spherical resonant cavity with one aperture is far from that required. (Knapp-USGS)
W74-10649

REMOTE SENSING REPORT, SAN FRANCISCO BAY AREA, APRIL-JULY 1972. VOLUME I.
National Field Investigations Center-Denver, Colo.
For primary bibliographic entry see Field 5A.
W74-10654

EQUIPMENT FOR MEASURING THE WATER PERMEABILITY AS A FUNCTION OF DEGREE OF SATURATION FOR FROST SUSCEPTIBLE SOILS,
Massachusetts Inst. of Tech., Cambridge.
For primary bibliographic entry see Field 2G.
W74-10657

USE OF WHATMAN-41 FILTERS IN AIR QUALITY SAMPLING NETWORKS (WITH APPLICATIONS TO ELEMENTAL ANALYSIS),
National Aeronautics and Space Administration, Cleveland, Ohio. Lewis Research Center.
For primary bibliographic entry see Field 5A.
W74-10666

REFLECTANT INDUCED MODIFICATION OF SOYBEAN CANOPY RADIATION BALANCE: 1. PRELIMINARY TESTS WITH A KAOLINITE REFLECTANT,
Nebraska Univ., Lincoln. Dept. of Agricultural Climatology.
For primary bibliographic entry see Field 2D.
W74-10668

VERIFICATION OF RAINFALL ESTIMATES: AN ANALYSIS OF ACTIVATION PATTERNS OF ADSID AND ACOUSID SEISMIC AND ACOUSTIC INTRUSION SENSORS TO DETERMINE RAINFALL RATES,
Elgin AFB Fla. Air Weather Service.
For primary bibliographic entry see Field 2B.
W74-10674

OPTICAL HOLOGRAPHY APPLICATIONS FOR THE ZERO-G ATMOSPHERIC CLOUD PHYSICS LABORATORY,
National Aeronautics and Space Administration, Huntsville, George C. Marshall Space Flight Center.
For primary bibliographic entry see Field 2B.
W74-10679

AREAL SNOWPACK WATER-EQUIVALENT DETERMINATIONS USING AIRBORNE MEASUREMENTS OF PASSIVE TERRESTRIAL GAMMA RADIATION,
EG and G, Inc., Las Vegas, Nev.
For primary bibliographic entry see Field 2C.
W74-10681

RADAR IN WEATHER MODIFICATION AND HAIL CONTROL,
For primary bibliographic entry see Field 3B.
W74-10687

PROCEDURE AND APPARATUS FOR MEASURING THE ATTENUATION OF RADAR RADIATION IN CLOUDS AND PRECIPITATION,
For primary bibliographic entry see Field 3B.
W74-10688

PROBLEMS OF TECHNICAL REALIZATION OF RADAR MEASUREMENTS OF HAIL,
For primary bibliographic entry see Field 3B.
W74-10689

MECHANISM OF RESPIRATORY EXCHANGES IN AQUATIC ENVIRONMENT: A GENERAL REVIEW INCLUDING PERSONAL RESULTS,
Amiens Univ. (France). Laboratoire de Physiologie.
For primary bibliographic entry see Field 5A.
W74-10713

A QUICK-WEIGHING LYSIMETER SYSTEM CHECK,
Agricultural Research Service, Prosser, Wash. Irrigated Agriculture Research and Extension Center.
J. E. Middleton.
Agricultural Engineering, Vol 53, No 7, p 14-15, July 1972. 1 fig.

Descriptors: *Lysimeters, Instrumentation, Moisture meters, Moisture content, Soil water, Evapotranspiration.

A quick dynamic lysimeter sensitivity check has been developed in which a 5 gallon water-filled container is placed on top of the soil at the center of a lysimeter. A 1/32-inch ID copper tube is soldered into the base of the container to slowly drain the water from the container and away from the lysimeter. Any operational malfunction will be indicated by an irregularity in the plotted time:weight loss curve. (Skogerboe-Colorado State)
W74-10749

MEASUREMENT OF LEAF WATER POTENTIAL IN WHEAT WITH A PRESSURE CHAMBER,
Agricultural Research Service, Mandan, N. Dak. Northern Great Plains Research Center.
For primary bibliographic entry see Field 3F.
W74-10811

RADIOACTIVE ISOTOPES FOR WATER-INPUT PROFILES,
For primary bibliographic entry see Field 8G.
W74-10838

REQUIREMENTS FOR THE MONITORING OF INDUSTRIAL DEEP-WELL WASTE-DISPOSAL SYSTEMS,
Dow Chemical Co., Houston, Tex.
For primary bibliographic entry see Field 5B.
W74-10867

7C. Evaluation, Processing and Publication

A GROUNDWATER QUALITY MODEL: A HYBRID COMPUTER SIMULATION,
California Univ., Los Angeles. School of Engineering and Applied Science.
For primary bibliographic entry see Field 5B.
W74-10352

QUALITY OF SURFACE WATERS OF THE UNITED STATES, 1968: PARTS 9 AND 10, COLORADO RIVER BASIN AND THE GREAT BASIN.
Geological Survey, Washington, D.C.
Available from Sup Doc, GPO Washington, D.C. 20402 Price $2.35. Water-Supply Paper 2098, 1973. 296 p, 1 fig, 39 ref.

Descriptors: *Water quality, *Data collections, *Hydrologic data, *Surface waters, *Colorado River basin, Water chemistry, Dissolved solids, Suspended load, Pesticides.
Identifiers: *Great basin.

The records of chemical analysis, water temperature, and suspended sediment of surface waters of the Colorado River basin given in this volume serve as a basis for determining the suitability of waters for various uses. Descriptive statements are given for each sampling station where chemical analyses, temperature measurements, or sediment determinations have been made. These statements include location of the station, drainage area, periods of records available, extremes of dissolved solids, hardness, specific conductance, temperature, sediment loads, and other pertinent data. Records of discharge of the streams at or near the sampling station are included in most tables of analyses. During the water year ending September 30, 1968, the Geological Survey maintained 93 stations on 57 streams for the study of chemical and physical characteristics of surface water. Samples were collected daily and monthly at 73 of these locations for chemical-quality studies. Samples also were collected less frequently at many other points. Water temperatures were measured continuously at 9 and daily at 55 stations. (Knapp-USGS)
W74-10353

WATER RESOURCES INVESTIGATIONS IN ARIZONA, 1973.
Geological Survey, Washington, D.C.
Free upon request to USGS, Washington, D.C. 20244. Water Resources Investigation Folder, 1973. 1 sheet, 9 fig, 1 tab.

Descriptors: *Water resources, *Investigations, *Arizona, Surface waters, Groundwater, Basic data collections, Data collections, Hydrologic data, *Maps.

The water-resources program of the U.S. Geological Survey in Arizona consists of the collection of basic information through its hydrologic-data stations, areal hydrologic and interpretive studies, and research projects. The basic data collected, the results of the areal studies, and the research findings are presented mainly in publications of the U.S. Geological Survey and Arizona agencies, but some appear also in technical journals and other publications. This folder contains a brief description of the water-resources investigations in Arizona in which the U.S. Geological Survey participates, and a list of selected references. (Knapp-USGS)
W74-10362

PRECIPITATION PROBABILITIES FOR EAST TENNESSEE,
Tennessee Univ., Knoxville. Dept. of Plant and Soil Science.
For primary bibliographic entry see Field 2B.
W74-10399

PRECIPITATION PROBABILITIES FOR MIDDLE TENNESSEE,
Tennessee Univ., Knoxville. Dept. of Plant and Soil Science.
For primary bibliographic entry see Field 2B
W74-10400

PRECIPITATION PROBABILITIES FOR WEST TENNESSEE,
Tennessee Univ., Knoxville. Dept. of Plant and Soil Science.
For primary bibliographic entry see Field 2B.
W74-10401

SALINE GROUNDWATERS PRODUCED WITH OIL AND GAS,
Bureau of Mines, Bartlesville, Okla. Bartlesville Energy Research Center.
For primary bibliographic entry see Field 5A.
W74-10411

INTERPRETATION OF LAND USE AND STREAM ORDER, PAWNEE RIVER BASIN, KANSAS.
Kansas Univ. Center for Research, Inc., Lawrence.
For primary bibliographic entry see Field 4A.
W74-10430

A RESERVOIR MODEL ALTERNATIVE TO THE UNIT HYDROGRAPH FOR FLOOD ESTIMATION,
Transport and Road Research Lab., Crowthorne (England).
For primary bibliographic entry see Field 4A.
W74-10432

SUMMARY OF TURBULENCE DATA FROM RIVERS, CONVEYANCE CHANNELS, AND LABORATORY FLUMES,
Geological Survey, Washington, D.C.
For primary bibliographic entry see Field 8B.
W74-10435

WATER-TABLE CONTOUR MAP, ANCHORAGE AREA, ALASKA,
Geological Survey, Anchorage, Alaska.
L. L. Dearborn, and G. W. Freethey.
Open-file report, 1974. 1 sheet, 1 map.

Descriptors: *Water table, *Alaska, *Maps, Water levels, Groundwater.
Identifiers: *Anchorage(Alaska).

This map shows contours of the water table in the Anchorage area of Alaska. In the map area it generally lies within 30 feet of the land surface. The water-table contours shown are based on the altitude of the water level in wells that just penetrate the water body. Water-level measurements used to prepare this map were made from 1955 to 1973. Seasonal fluctuation of the water table normally ranges between 1 and 4 feet. (Knapp-USGS)
W74-10436

MEASUREMENT OF ENVIRONMENTAL POLLUTION AND ITS SYSTEMIZATION,
Hitachi Ltd., Tokyo (Japan).
For primary bibliographic entry see Field 5A.
W74-10438

INFORMATION STORAGE AND RETRIEVAL SYSTEM FOR WELL HYDROGRAPH DATA USER'S MANUAL,
Battelle-Pacific Northwest Lab., Richland, Wash. Water and Land Resources Dept.
For primary bibliographic entry see Field 4B.
W74-10442

WATERHEAD FORECAST POSSIBILITIES ON HYDRAULIC BASIS,
For primary bibliographic entry see Field 4A.
W74-10453

WATER QUALITY CRITERIA DATA BOOK - VOL. 5 - EFFECTS OF CHEMICALS ON AQUATIC LIFE,
Battelle Columbus Lab., Ohio.
For primary bibliographic entry see Field 5C.
W74-10541

THE ANALYSIS OF SOME MONTHLY HYDROLOGIC TIME SERIES,
Idrutecneco, San Lorenzo in Campo (Italy).
For primary bibliographic entry see Field 2A.
W74-10606

WATER POLLUTION BEING FOUGHT BY COMPUTER.
For primary bibliographic entry see Field 5G.
W74-10610

QUALITY OF SURFACE WATERS OF THE UNITED STATES, 1968: PARTS 12-16. NORTH PACIFIC SLOPE BASINS, ALASKA, HAWAII, AND OTHER PACIFIC AREAS.
Geological Survey, Washington, D.C.
For primary bibliographic entry see Field 5A.
W74-10616

QUALITY OF SURFACE WATERS OF THE UNITED STATES, 1968: PART 7. LOWER MISSISSIPPI RIVER BASIN.
Geological Survey, Washington, D.C.
For primary bibliographic entry see Field 5A.
W74-10617

COLLECTION AND ANALYSIS OF REMOTELY SENSED DATA FROM THE RHODE RIVER ESTUARY WATERSHED,
Smithsonian Institution, Edgewater, Md. Chesapeake Bay Center for Environmental Studies.
For primary bibliographic entry see Field 2L.
W74-10622

METHODS OF EVALUATING THE EFFECT OF A COMPLEX OF HUMAN FACTORS ON WATER RESOURCES AND WATER REGIME OF WATERSHEDS (O METODAKH OTSENKI VLIYANIYA KOMPLEKSA FAKTOROV KHOZYAYSTVENNOY DEYATEL'NOSTI NA VODNYYE RESURSY I VODNYY REZHIM VODOSBOROV),
Gosudarstvennyi Gidrologicheskii Institut, Leningrad (USSR).
For primary bibliographic entry see Field 4C.
W74-10627

FLOOD HAZARD ANALYSES, BONNER BRANCH OF THE PECATONICA RIVER, BELMONT, WISCONSIN.
Soil Conservation Service, Madison, Wis.
For primary bibliographic entry see Field 2E.
W74-10635

COMPUTER ANALYSIS FOR ACOUSTIC SENSING OF MULTILAYER SEDIMENTS,
New Hampshire Univ., Durham. Dept. of Mechanical Engineering.
For primary bibliographic entry see Field 2J.
W74-10637

ATS AMARGOSA TRACER STUDY - PROGRAM MANUAL,
Computer Sciences Corp., Las Vegas, Nev. Scientific Systems Dept.
For primary bibliographic entry see Field 5B.
W74-10638

HYDROLOGIC DATA FOR NORTH CREEK TRINITY RIVER BASIN TEXAS, 1972,
Geological Survey, Austin Tex.
R. M. Slade, Jr.
Open-file report, May 1974. 31 p, 2 fig, 3 tab.

Descriptors: *Hydrologic data, *Small watersheds, *Texas, Rainfall-runoff relationships, Storm runoff, Flood control, Dams, Reservoirs, Data collections, Basic data collections.
Identifiers: North Creek(Tex).

This report contains the rainfall, runoff, and storage data collected during the 1972 water year for the 21.6 sq mi area above the stream-gaging station North Creek near Jacksboro, Texas. The locations of floodwater-retarding structures and hydrologic instrument installations in the area are shown. There are five floodwater-retarding structures in the North Creek study area. These structures have a combined capacity of 4,425 acre-feet and regulate streamflow from 16.3 sq mi or 75% of the study area. The average rainfall during the 1972 water year was 24.03 inches, which is considerably less than the 15-year average of 29.72 inches for the period 1958-72. The yearly mean discharge at the stream-gaging station was 1.91 CFS, compared with the 14-year (1957-70) average of 5.75 CFS prior to the effect caused by the floodwater-retarding structures. The annual runoff from the basin above the stream-gaging station was 1,390 acre-feet. (Knapp-USGS)
W74-10640

WATER AVAILABILITY IN CENTRAL WISCONSIN - AN AREA OF NEAR-SURFACE CRYSTALLINE ROCK,
Geological Survey, Washington, D.C.
For primary bibliographic entry see Field 4B.
W74-10647

PHOTO-HYDROLOGICAL RECONNAISSANCE SURVEYS,
International Inst. for Aerial Survey and Earth Sciences, Enschede (Netherlands).
For primary bibliographic entry see Field 7B.
W74-10648

ONE-DIMENSIONAL ANALYSIS OF HEAT DISSIPATION IN A SIDEARM OF A COOLING LAKE,
Oak Ridge National Lab., Oak Ridge, Tenn.
For primary bibliographic entry see Field 5B.
W74-10651

CHEMICAL DATA FROM OREGON WATERS, 1972,
Oregon State Univ., Corvallis. School of Oceanography.
For primary bibliographic entry see Field 5B.
W74-10652

PRELIMINARY STUDY OF THE QUALITY OF WATER IN THE DRAINAGE AREA OF THE JEMEZ RIVER AND RIO GUADALUPE,
Los Alamos Scientific Lab., N. Mex.
For primary bibliographic entry see Field 5B.
W74-10658

MISSOURI RIVER HYDROLOGY (STREAMFLOW AND TEMPERATURE)--SIOUX CITY, IOWA TO RULO, NEBRASKA,
Battelle-Pacific Northwest Lab., Richland, Wash.
For primary bibliographic entry see Field 2E.
W74-10659

THE STRANGE WORLD OF MISCIBLE DISPLACEMENT,
Louisiana State Univ., Baton Rouge. Dept. of Civil Engineering.
For primary bibliographic entry see Field 5B.
W74-10664

RANDOM-ACCESS TECHNIQUE FOR MODULAR BATHYMETRY DATA STORAGE IN A CONTINENTAL-SHELF WAVE-REFRACTION PROGRAM,
National Aeronautics and Space Administration, Langley Station, Langley Research Center.
L. R. Poole.
Available from NTIS, Springfield, Va 22161 as NASA TM X-3018 Price $3.00 printed copy; $2.25 microfiche. Technical Memorandum X-3018, July 1974. 21 p, 6 fig, 1 tab, 1 ref, append.

Descriptors: *Data processing, *Refraction(Water waves), *Data storage and retrieval, *Computer programs, *Bathymetry.
Identifiers: Random-access techniques.

A method for storage and use of bathymetry data was developed for the computer program used in studies of wave refraction at the Langley Research Center and Virginia Institute of Marine Science. The regional bathymetry array was divided into 105 indexed modules which can be read individually into memory in a nonsequential manner from a peripheral file using special random-access subroutines. In running a sample refraction, a 75% decrease in program field length was achieved by using the random-access storage method in comparison with the conventional method of total regional array storage. This field-length decrease was accompanied by a comparative 5% increase in central processing time and a 477% increase in the number of operating-system calls. System cost savings of 68% was achieved by using the random-access storage method. (Knapp-USGS)
W74-10671

FLOOD PLAIN INFORMATION--PETERS CREEK, BIRCHWOOD, ALASKA,
Corps of Engineers, Anchorage, Alaska.
For primary bibliographic entry see Field 4A.
W74-10684

OGALLALA AQUIFER WATER-LEVEL DATA, WITH INTERPRETATION, 1965-1974,
High Plains Underground Water Conservation District No. 1, Lubbock, Tex.
For primary bibliographic entry see Field 4B.
W74-10685

SURFACE WATER SYSTEM -- 1973,
Wyoming Univ., Laramie. Water Resources Research Inst.
V. E. Smith.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-234 550, $4.50 in paper copy, $2.25 in microfiche. Water Resources Series No. 43, January 1974. 111 p, 2 append. OWRR A-001-WYO(67).

Descriptors: *Wyoming, *Computer programs, *Hydrologic data, Data collections, *Data storage and retrieval, Surface waters, *Streamflow, *Average flow, Annual, Duration curves, Frequency analysis, Discharge frequency.

Since the initial development in 1968 of Surface Water Systems (SWS), a computerized system of storage, massage and printout of surface water, numerous additions and revisions have been made. This report updates the previous publication (Embree and Larson, 1970 - See W70-05464) describing the available analyses and data.
W74-10695

DESIGNING. PLUG IN A COMPUTER,
Spotts, Stevens and McCoy, Wyomissing, Pa.
For primary bibliographic entry see Field 5D.
W74-10825

SURFACE TO SUBSURFACE CORRELATION OF COLUMBIA RIVER BASALT USING GEOPHYSICAL DATA IN PARTS OF ADAMS AND FRANKLIN COUNTIES, WASHINGTON,
Washington State Univ., Pullman. Dept. of Civil Engineering.
For primary bibliographic entry see Field 4B.
W74-10858

THE OCCURRENCE OF WATER IN THE PRECAMBRIAN CRYSTALLINE ROCKS OF THE NEW JERSEY HIGHLANDS,
Rutgers. The State Univ., New Brunswick, N.J.
For primary bibliographic entry see Field 4B.
W74-10872

8. ENGINEERING WORKS

8A. Structures

AN EXPERIMENTAL AND THEORETICAL STUDY OF THE FLOW FIELD SURROUNDING A SUCTION PIPE INLET,
Texas A and M Univ., College Station. Dept. of Civil Engineering.
W. J. Apgar, and D. R. Basco.
Available from NTIS, Springfield, Va 22161 as COM-74-10172, Price $3.75 printed copy; $2.25 microfiche. Sea Grant College Report TAMU-SG-74-203 (Center for Dredging Studies Report No 172), October 1973. 71 p, 33 fig, 12 ref, 2 append. NOAA Sea Grant 04-3-158-18.

Descriptors: *Intakes, *Pipes, *Hydraulic design, *Mathematical models, Intakes structures, Reservoirs, Hydraulic structures, Outlet works, Spillways, Fluid mechanics, Hydraulics.
Identifiers: Inlets(Suction).

A mathematical model was developed to calculate the flow field around a single suction pipe inlet near a horizontal boundary in an infinite reservoir. The basis for the theoretical approach was potential-flow theory which neglects frictional and viscous effects. For simplicity, a point sink was employed. In order to investigate the actual flow conditions, an experimental apparatus was developed to test a model suction inlet. The inlet was a simple cylindrical pipe placed at various heights from and at an angle to the horizontal boundary. The experimental results conformed to theory for initial flow conditions when viscous effects were small. The viscous effects subsequently caused an altered flow with zones of separation. The resulting flow development negated the value of the potential-flow solution. (Knapp-USGS)
W74-10392

EROSION OF THE NORTH SHORE OF LONG ISLAND,
State Univ. of New York, Stony Brook. Marine Sciences Research Center.
For primary bibliographic entry see Field 2J.
W74-10440

SHOTCRETE AT MEXICO CITY,
For primary bibliographic entry see Field 8F.
W74-10452

ANOTHER UNUSUAL SEWERAGE PROBLEM SOLVED WITH DUCTILE IRON PIPE,
Cast Iron Pipe News, Vol 40, No 3, p 8-9, Third Quarter, 1973. 3 fig.

Descriptors: Engineering structures, *Pipes, *Sewers, *Separated sewers, *Metal pipes, Infiltration.
Identifiers: *Ductile iron pipe.

The use of ductile iron pipe in the construction of a new sanitary sewage collection and treatment system for a large lumber mill in Oregon is described. Domestic sewage of the company will be treated in a new stabilization pond and by chlorination. The sanitary sewer system of the mill was deteriorating for a number of years because of excessive crushing wheel loads generated from heavy operating equipment and septic attack. Breaks in the system not only were contributing to the already heavy groundwater infiltration from around the joints, but also prevented the passage of a television camera through the lines for purposes of inspection. The decision to use ductile iron pipe with its high beam strength, its great resistance to crushing, and the water tightness of its push-on joints was based on excessive wheel loads from trucks and heavy equipment, the desire to keep infiltration in the new line to zero, the volcanic type soil conditions with deposits of cinders and cemented gravels, and a high ground water table in the desert area of the mill. The lines were constructed with cast iron tees to connect the six-inch ductile iron services to the eight-inch ductile iron laterals and mains. Tees were also placed at strategic locations in the lines with the six-inch opening plugged for possible future service connections. (Merritt-FIRL)
W74-10455

PRITTLE BROOK DIVERSION TUNNEL,
K. S. Trollop.
The Institution of Municipal Engineers, Vol 101, No 2, p 37-42, February, 1974. 7 fig.

Descriptors: *Tunnelling, *Tunnel construction, *Flood control, Rivers, Storm runoff, Water pollution control.
Identifiers: *United Kingdom(Prittle Brook).

The catchment area of Prittle Brook is described, in addition the the characteristics of the brook itself which is lined with concrete. Severe storms in 1968 caused flooding. Consideration was given to several alternatives for minimizing risks of a similar occurrence in the future. A tunnel diversion scheme was chosen to alleviate conditions during storm flows. The proposed scheme, implementation procedures, and sewers involved are described. The tunnel itself was constructed with little in the way of design problems; mechanical soft rock tunneling procedures were used. Excavation was by rotary drum digger and steering was by hydraulic jack, all built into a shield. The tunnel lining is made of precast concrete blocks with a wedge section forced home by a ram. (Murphy-FIRL)
W74-10482

MOLECULE SEPARATOR,
LKB - Produkter A.B., Bromma (Sweden).
E. R. Ryhage.
U.S. Patent 3,803,811. Issued April 16, 1974. Official Gazette of the U.S. Patent Office, Vol 921, No 13, p 914, April 16, 1974. 1 fig.

Descriptors: *Patents, *Separation techniques, Pumps, *Nozzles, Equipment, Pumping.
Identifiers: *Molecular separators, Sweden.

A molecular separator is described which acts according to the jet principle. It consists of at least one separation stage with an evacuation chamber, connected to a pump provided with two coaxially arranged nozzles for the gas phase subject to separation. One of the nozzles is axially displaceable. There is a method of controlling the distance between the nozzles from outside the separator while it is in operation. (Merritt-FIRL)
W74-10491

CORRUGATED DRAINAGE PIPE,
Plastic Tubing, Inc., Roseboro, N.C.
E. J. Maroschak.
U.S. Patent 3,802,202. Issued April 9, 1974. Official Gazette of the U.S. Patent Office, Vol 921, No 2, p 498, April 9, 1974. 1 fig.

Descriptors: *Engineering structures, *Pipes, *Drainage engineering, *Plastics, *Patents, Drains, Design, Piping systems(Mechanical).

A corrugated plastic drainage pipe is described. The pipe has spaced apart annular ribs, certain ribs being interrupted and having a set of three circularly arranged spaced apart arcuate rib segments. The segments define a series of three drainage holes positioned between the ends of adjacent rib segments where the rib segments are of such extent and so arranged as to position the drainage holes around the bottom of the pipe. This provides a visual means of aiding in installing the pipe in the ground with all of the drainage holes located below the horizontal center line of the pipe and with the intermediate drainage holes occupying the lowermost position. (Murphy-FIRL)
W74-10499

ON THE VARIANCE OF THE STATIONARY PROBABILITY VECTOR FOR A FINITE DAM,
Australian National Univ., Canberra. Computer Centre.
C. L. Jarvis.
Journal of Hydrology, Vol 21, No 3, p 291-297, 1974. 3 tab, 5 ref.

Descriptors: *Probability, *Dams, *Mathematical models, Streamflow, Numerical analysis, Rivers, *Australia.
Identifiers: *Stationary probability vector, *Ord River(Australia), Netherlands.

A method for estimating the variance of the stationary probability vector for the finite dam is discussed. The method relies upon the constancy of a gradient matrix in the vicinity of the solution and a simple numerical differentiation technique is found to be adequate. An example of the variance calculation is given by applying the method to streamflow data previously used in application of Moran's theory of dam to the Ord River project. (Merritt-FIRL)
W74-10574

SEWERAGE SYSTEMS DESIGN.
For primary bibliographic entry see Field 5D.
W74-10575

SEA WALL CONSTRUCTION,
Seawall Enterprises, Inc., Des Moines, Wash.
B. J. Dickinson.
U.S. Patent No 3,802,205, 7 p, 27 fig, 8 ref; Official Gazette of the United States Patent Office, Vol 921, No 2, p 499, April 9, 1974.

Descriptors: *Patents, *Breakwaters, *Sea walls, *Shore protection, Precast concrete, Steel piles.

A modular sea wall structure utilizes steel beam bearing pilings between and on which are supported modular concrete block units. The pilings are driven as deeply as required to give firm support and the bottommost concrete block unit is positioned between and resting on two adjacent pilings at a preselected depth below or above the bottom surface. The top block is post tensioned and the intermediate blocks are designed along with the other structural components to hold the geometry of the wall. All steel parts, namely, pilings, and pretensioned cables, are sealed or isolated from the corrosive effects of water and air. Flexibility of movement is maintained between component parts such as blocks and pilings. (Sinha-OEIS)
W74-10594

LASER LIGHT USED TO LAY PIPE,
J. Gautreau.
Water Pollution Control, Vol 112, No 1, p 34-35, January, 1974. 1 fig.

Descriptors: Engineering structures, Sewerage, *Sewers, Equipment, *Construction equipment, *Canada.
Identifiers: *Lasers, Quebec.

The application of laser beams for the alignment of sewer pipe, storm drains, and other gravity conduits is discussed. Productivity can be increased by as much as 50 percent, alignment accuracy enhanced to within 1/8 of an inch, and surveying greatly simplified. In laying sewer pipe, both the pipe crew and backhoe operator are guided by a pencil-thin ray of red laser light through or beside the pipe onto a target for precise positioning. One of the lasers currently used in Canada is the Laser-Beam Aligner made by Laser Alignment, Inc. Accuracy of this unit on a Quebec storm drain job was reported as a 6-inch drop along an 0.7 mile long line. Another feature making this model popular is that the average set-up time is only about ten minutes. Once set up, the device operates essentially unattended. (Merritt-FIRL)
W74-10612

LARGE DIAMETER POLYETHYLENE FORGE MAINS INSTALLED QUICKLY,
R. W. Lash.
Public Works, Vol 105, No 1, p 45-47, January, 1973. 4 fig.

Descriptors: Engineering structures, Pipes, *Plastic pipes, *Ohio, *Sewers.
Identifiers: *Polyethylene pipes, *Mains, Fremont(Ohio).

The use of large diameter polyethylene pipe as a sewage force main in Fremont, Ohio, is described. The installation was part of a sewerage system improvement program with the capacity to handle up to 8,000 new homes. Under the double force main design, 12- and 24-inch force mains run from a new pumping station with each main discharging into separate existing gravity sewer manholes located along the main business street. Both force mains start adjacent to each other at the new pumping station and run 1500 feet along the street where the 12-inch force main terminates and the 24-inch pipe continues for another 1,200 feet. The force mains were laid mainly under the sidewalks to minimize excavation in the street and interference from other underground utilities. Due to the design, the project called for many special bends. Polyethylene pipe was chosen over other plastic pipes because it could be installed without the use of special fittings since it can bend at a 45 degree angle without damage. Up to 190 feet of pipe a day was installed. (Merritt-FIRL)
W74-10613

HYDRAULIC MODEL STUDIES OF THE LOW-LEVEL OUTLET WORKS, LG-2 DEVELOPMENT, QUEBEC, CANADA,
Bureau of Reclamation, Denver, Colo. Engineering and Research Center.
For primary bibliographic entry see Field 8B.
W74-10636

PRACTICES AND PROBLEMS IN THE CONFINEMENT OF DREDGED MATERIAL IN CORPS OF ENGINEERS PROJECTS,
Army Engineer Waterways Experiment Station, Vicksburg, Miss. Soils and Pavements Lab.
For primary bibliographic entry see Field 5E.
W74-10665

PRACTICES IN DETENTION OF URBAN STORMWATER RUNOFF,
Poertner (Herbert G.), Bolingbrook, Ill.
For primary bibliographic entry see Field 4A.
W74-10696

PUBLIC WORKS FOR WATER AND POWEER DEVELOPMENT AND ATOMIC ENERGY COMMISSION APPROPRIATION BILL, 1975, PART I, PART II.
For primary bibliographic entry see Field 6E.
W74-10697

AUTHORIZING THE SECRETARY OF THE INTERIOR TO CONSTRUCT, OPERATE, AND MAINTAIN THE CLOSED BASIN DIVISION OF THE SAN LUIS VALLEY PROJECT, COLORADO.
Committee on Interior and Insular Affairs (U.S. Senate).
For primary bibliographic entry see Field 6E.
W74-10706

PIPE JACKING -- A TECHNIQUE FOR SOFT GROUND TUNNELLING,
Cementation Co. Ltd., Calcutta (India).
N. K. Basu.
Indian Concrete Journal, Vol 47, No 9, p 328-334, 343, 1973. 8 fig, 8 ref.

Descriptors: *Sewers, *Tunnels, *Pipes, Conduits, Engineering structures.
Identifiers: *Jacking, *India(Calcutta), *Pipe jacking.

Pipe jacking is a technique which is extemely useful for the construction of sewer lines, pedestrian subways, and irrigation conduits below ground without disrupting the surface, particularly in the case of soft ground where traditional mining and tunnelling processes may be difficult. The technique of pipe jacking consists in placing prefabricated pipes in the ground by driving them from a pit prepared beforehand. In addition to a detailed explanation of the process and jacking equipment, several examples of the successful use of this method are detailed. It was employed for laying a reinforced concrete sewer, 36.6 meters long and 3 to 3.5 meters in diameter, under railway tracks near Calcutta. It crossed seven meters below the tracks, and hardly interfered with the rail traffic. It was probably the first time a pipe of that size was jacked in India. (Murphy-FIRL)
W74-10821

HOW GEOTHERMAL WELLS ARE DRILLED AND COMPLETED,
Big Chief Drilling Co., Oklahoma City, Okla.
J. Cromling.
World Oil, Vol 177, No 7, p 42-45, December, 1973. 3 fig.

Descriptors: *Geothermal studies, *Geysers, Subsurface water, Steam, *Rotary drilling, Drilling fluids, Drilling equipment, *California.
Identifiers: *Geothermal well completions, *Geothermal well drilling, Imperial Valley(Calif).

Detailed information is presented on surface and downhole drilling equipment, casing design, mud and cement programs, and completion procedures in geothermal areas such as the Imperial Valley of California. The preferred rig consists of a 250,00 pound derrick, the largest hook load, with 300-hp drawworks powered by a 450-hp engine. The casing program consists of a 20-inch conductor set at 110 feet, followed by 13 3/8 inch 48 ppf H-40 surface pipe to a depth of 1050 feet. A 7 7/8 inch hole is then drilled to TD. If the well is a potential producer, the hole is opened to 10 5/8, and a 8 5/8 inch production liner is hung at approximately 900 feet. Fresh water gel-lignite muds are commonly used in the Imperial Valley. No high pressure zones are encountered, and mud weight is maintained for hole stability. Normally, a 7 7/8 inch bit will drill as fast as hole stability and drilling conditions allow. One bit commonly penetrates 1000 feet in 20 hours. Drilling in Geyser areas poses many problems such as crooked holes; directional drilling; excessive drill string torque; and abrasive wear of the drill stem. A typical steam well in Geyser areas costs about $350,000. (Campbell-NWWA)
W74-10860

BASIC DISPOSAL-WELL DESIGN,
Du Pont de Nemours (E.I.) and Co., Wilmington, Del. Engineering Service Div.
For primary bibliographic entry see Field 5B.
W74-10865

DEEP-WELL ACID DISPOSAL--PLANNING AND COMPLETION,
Halliburton Services, Duncan, Okla.
For primary bibliographic entry see Field 5B.
W74-10866

CONTROL OF UNCONSOLIDATED SANDS IN WASTE-DISPOSAL WELLS,
Subsurface Disposal Corp., Houston, Tex.
K. E. Davis, and R. J. Funk.
In: Underground Waste Management and Environmental Implications, symposium held December 6-9, 1971, Houston, Texas, p 112-118, (1971). 4 fig, 3 tab, 9 ref.

Descriptors: *Waste disposal wells, *Sands, Injection wells, Waste disposal, *Underground waste disposal, Screens.
Identifiers: *Sand-control methods, Unconsolidated sands, Sand-control problems.

The increasing use of unconsolidated sands as disposal zones has created a need for better sand-control systems. The primary causes of sand-control problems in disposal wells are (1) greater completion intervals, (2) intermittent operation of the well, and (3) chemical characteristics of the injected effluent. In order to prevent sand production in disposal wells, consideration must be given to (1) formation characteristics, (2) completion fluid, (3) type of completion, and (4) completion method. Two universally used methods of sand exclusion are in-place sand consolidation with plastics, and the use of gravel packs in conjunction with sand screens. Sand consolidation has limited application because of the large completion intervals normally used in disposal wells and because of possible chemical reactions with injected effluent. However, a gravel-pack sand screen

completion generally eliminates the three primary causes of sand production in disposal wells. Factors of prime importance are (1) the drilling and completion fluids, (2) formation grain size and composition, (3) size and amount of gravel, (4) pumping rate, (5) pressure, and (6) gravel concentration. Field and laboratory data show that the method of gravel-pack sand-screen completions can be used successfully over intervals as great as 585 ft (178 m) in unconsolidated Frio sands. (See also W72-14480) (Martino-NWWA)
W74-10868

ENVIRONMENTAL INFLUENCES ON OFFSHORE FACILITIES,
National Oceanic and Atmospheric Administration, Washington, D.C. Environmental Data Service.
For primary bibliographic entry see Field 6G.
W74-10898

CAN DREDGING BE CONTINUED TO MAINTAIN GREAT LAKES,
Corps of Engineers, Chicago, Ill. North Central Div.
For primary bibliographic entry see Field 6D.
W74-10899

8B. Hydraulics

EFFECT OF A LOW IMPERMEABLE GROIN ON SHOREZONE GEOMETRY AND TEXTURE, POINT MUGU, CALIFORNIA,
California Univ., Los Angeles. Dept. of Geography.
A. R. Orme.
Available from NTIS, Springfield, Va. 22161 as AD-774 309, Price $4.25 printed copy; $2.25 microfiche. Army Coastal Engineering Research Center Final Contract Report, November 13, 1973. 109 p, 24 fig, 23 tab, 9 ref, 1 append. Contract No DACW 72-73-C-007.

Descriptors: *Beaches, *Coastal engineering, *Sediment transport, *Shore protection, *Groins(Structures), Coastal structures, Jetties, Sedimentation, Statistics, Sediment sorting, Littoral drift, Surf, *California.

The effects of a low impermeable groin on the geometry and texture of the adjacent shorezone were studied with an experimental groin near Point Mugu, California. One profile was measured upcoast, the other downcoast. During the time of the study the longshore current flowed upcoast for 90 days and downcoast for 38 days. Weak long-term trends occur toward net fill downcoast and net scour upcoast beyond the end of the groin. The alternating scour and fill experienced by offshore stations along both profiles are transmitted inshore with diminishing magnitude and increasing time lag. Fill occurs offshore before it occurs inshore. Inshore stations continue to scour while awaiting the fill. Factor analyses indicate five zones of sympathetic geometric response to given energy conditions along the profiles. Despite these zones, there is no relationship between individual stations facing one another across the groin, indicating that cross-groin response is independent. Coarser sediments are found on the upcoast side, due to the reworking of winter lag deposits, and toward the berm on both profiles. Better sorting is found on the downcoast side. Trends over the period are weak, and there is no textural correlation between stations on the same side of the groin, nor between stations facing one another across the groin. This again indicates the effect of the groin in generating independent cross-groin responses. Trends at most individual stations, however, show that as sediments become coarser over time so their sorting worsens. (Knapp-USGS)
W74-10358

A FIELD INVESTIGATION OF THE HYDRAULICS AND STABILITY OF CORPUS CHRISTI WATER EXCHANGE PASS, TEXAS,
Texas A and M Univ., College Station. Dept. of Civil Engineering.
For primary bibliographic entry see Field 2L.
W74-10361

SEDIMENT TRANSPORT IN RANDOM WAVES,
Delaware Univ., Newark. Dept. of Civil Engineering.
For primary bibliographic entry see Field 2J.
W74-10390

AN EXPERIMENTAL AND THEORETICAL STUDY OF THE FLOW FIELD SURROUNDING A SUCTION PIPE INLET,
Texas A and M Univ., College Station. Dept. of Civil Engineering.
For primary bibliographic entry see Field 8A.
W74-10392

SIMILARITY LAWS FOR TURBULENT FLOW OF DILUTE SOLUTIONS OF DRAG-REDUCING POLYMERS,
Naval Ship Research and Development Center, Bethesda, Md.
T. T. Huang.
Available from NTIS, Springfield, Va. 22161 as AD-766 787, Price $3.00 printed copy; $2.25 microfiche. Report 4096, August 1973. 35 p, 14 fig, 1 tab, 42 ref.

Descriptors: *Turbulent flow, *Pipe flow, *Drag, *Polymers, Fluid mechanics, Flow resistance, Hydraulics, Turbulent boundary layers, Organic compounds.
Identifiers: *Drag reduction.

For turbulent boundary layers with dilute polymer solutions, velocity similarity laws based on a four-layer, mean-velocity-profile model were deduced by means of pipe-flow experiments. Drag reduction has three domains: undersaturated, optimal, and oversaturated. The drag reduction does not increase with increasing concentration in the oversaturated domain where a strong interactive layer dominates the entire linear logarithmic region of the boundary layer. Drag reduction increases with increasing concentration in the undersaturated domain where the four-layer profile exists in the boundary layer. The boundary between the two domains gives optimal drag reduction; it is determined by the polymer type and concentration and by a Reynolds number based on shear velocity and boundary-layer thickness. Pipe-flow experiments have been made to study the drag-reduction characteristics in the undersaturated domain. The effects of solvent temperature, pipe diameter, polymer type and concentration, and wall shear stress on the measured drag reduction were also investigated. (Knapp-USGS)
W74-10426

THE INFLUENCE OF THE CHEMICAL NATURE OF POLYMERS ON THEIR DRAG REDUCTION CHARACTERISTICS,
Hydronautics, Inc., Laurel, Md.
M. A. Frommer, A. Lavy, M. Kraus, and C. Elata.
Available from NTIS, Springfield, Va. 22161 as AD-766 799, Price $3.00 printed copy; $2.25 microfiche. Technical Report 7213-1, June 1973. 28 p, 4 fig, 7 tab, 19 ref, append. ONR Contract N00014-72-C-0510.

Descriptors: *Drag, *Polymers, Fluid mechanics, Flow resistance, Hydraulics, Turbulent boundary layers, Chemical properties, *Molecular structure, Organic compounds.
Identifiers: *Drag reduction.

The effects of molecular characteristics of water soluble polymers on drag reduction were investigated by studying changes in the drag reduction efficiency of long chain vinylic polymers having an identical polymeric backbone with changes in the chemical nature of their functional groups and by studying the effect of conformational changes of a single polymer on its drag reduction efficiency. Conformational changes may be brought about in many vinylic chain polymers by changing the pH or adding salt to the solution. The polymers studied were polyacrylamide, hydrolyzed polyacrylamide, polyacrylhydrazide, and polystyrene sulfonate. Increase of pH in aqueous solutions of hydrolyzed polyacrylamide from 2 to 8 results in a marked increase of drag reduction. Addition of NaCl and BaCl2 to aqueous solutions results in a decrease of drag reduction efficiency. The effect of BaC12 is much greater than that of NaC1 in decreasing drag reduction efficiency. Drag reduction efficiency of a polymer in solution increases when its conformation is changed, so that the molecule becomes more extended. (Knapp-USGS)
W74-10427

SUMMARY OF TURBULENCE DATA FROM RIVERS, CONVEYANCE CHANNELS, AND LABORATORY FLUMES,
Geological Survey, Washington, D.C.
R. S. McQuivey.
Available from Sup Doc, GPO, Washington, DC 20402, price $1.55. Professional Paper 802-B, 1973. 66 p, 40 fig, 12 tab, 13 ref.

Descriptors: *Turbulence, *Open channel flow, *Turbulent flow, *Alluvial channels, *Sediment transport, Bed load, Suspended load, Vortices, Flumes, Rivers, Estuaries, Hydraulics, Data collections, Hydrologic data.

Turbulence characteristics of turbulent shear flow were obtained by use of hot-film anemometry. Related hydraulic and sediment data were also collected. Data were collected from the study of flow in 20-centimeter, 2-foot, 4-foot, and 8-foot-wide recirculating flumes, over rigid and alluvial boundaries. Alluvial boundary data were also collected in the Atrisco feeder canal near Bernalillo, N. Mex., the Rio Grande conveyance channel near Bernardo, N. Mex., the Columbia River estuary near Astoria, Oreg., the Missouri River near Omaha, Nebr., and the Mississippi River near Vicksburg, Miss. The longtitudinal and vertical components of the turbulent intensity, the macroscale and microscale of turbulence, the Eulerian integral time scale, the measured turbulent shear stress, the local mean velocities, the slope, the depth, the width, the discharge, the temperature, the suspended-sediment concentration, and the total bed-material discharge. Some longitudinal turbulence intensities were obtained from a standard Price current meter and a small propeller meter at three of the field locations. These data are reported along with the hot-film anemometer measurements. (Knapp-USGS)
W74-10435

CHANNEL NETWORK SIMULATIONS,
IBM Watson Research Center, Yorktown Heights, N.Y.
For primary bibliographic entry see Field 4A.
W74-10443

NOMOGRAPHS CALCULATE DISCHARGE FROM OPEN, HORIZONTAL PIPE,
A. Zanker.
Heating/Piping/Air Conditioning, Vol 46, No 4, p 69-70, April, 1974. 3 fig.

Descriptors: *Environmental engineering, Hydraulics, *Discharge(Water), *Pipes, Mathematical models, Model studies.
Identifiers: *California pipe flow method, *Nomographs.

The California pipe flow method for estimating the discharge of water requires that a pipe be horizontal and at least six pipe diameters in length. No orifice or nozzle is required for this method, and the only two necessary measurements are the inside diameter of the pipe, and the distance from the inside top of the pipe to the surface of the flowing water. Although the California method is very simple, it may become troublesome to calculate because of the fractional exponents involved. Two nomographs are given which solve the equation within a matter of seconds. (Murphy-FIRL)
W74-10457

ON THE VARIANCE OF THE STATIONARY PROBABILITY VECTOR FOR A FINITE DAM,
Australian National Univ., Canberra. Computer Centre.
For primary bibliographic entry see Field 8A.
W74-10574

METHOD AND APPARATUS FOR DAMPING WAVE ACTION,
Offshore Co., Houston, Tex. (assignee)
F. A. Bryant.
U S Patent No 3,803,849, 3 p, 4 fig, 9 ref; Official Gazette of the United States Patent Office, Vol 921, No 3, p 924, April 16, 1974.

Descriptors: *Patents, Pollution, *Bubbles, *Shore protection, Equipment, Air, Barriers.
Identifiers: *Wave action, Wave energy, *Damping.

Damping of wave action is achieved when air is injected into the water as discrete, minute bubbles. A compressor is connected to the bubble generating assembly by a duct or hose to deliver the air to the assembly for injection into the water. The apparatus includes an elongate manifold, a support bar and bubble generating elements. (Sinha-OEIS)
W74-10590

SEA WALL CONSTRUCTION,
Seawall Enterprises, Inc., Des Moines, Wash.
For primary bibliographic entry see Field 8A.
W74-10594

SEWER LINE DESIGN BASED ON CRITICAL SHEAR STRESS,
West Pakistan Univ. of Engineering and Technology, Lahore. Dept. of Sanitary Engineering.
K. M. Yao.
Journal of the Environmental Engineering Division, American Society of Civil Engineers Vol 100, No EE2, p 507-520, April, 1974. 8 fig, 14 ref.

Descriptors: *Model studies, *Mathematical models, *Sewers, Hydraulics, Engineering structures, *Design.
Identifiers: *Critical shear stress.

Practical aspects in applying the critical shear stress approach for the hydraulic design of circular sewers were investigated. The minimum velocity approach was compared to the critical shear stress approach in terms of their effectiveness in achieving self-cleaning action, and their relative effects on the engineering design. Also, a procedure was developed for the application of the critical shear stress approach in practical design of circular sewers. The following conclusions were reached: a critical shear stress in the range of 0.02 psf to 0.04 psf seems to be adequate for sanitary sewers, while 0.06 psf to 0.08 psf applies to storm sewers; design equations based on Manning's formula have been developed using the critical shear stress approach; using a constant minimum velocity for all sewer sizes tends to underdesign large sewers and overdesign small ones; critical shear stress approach provides a more economical design in the case of partially full flow with the flow depth less than 0.4 of the sewer diameter; a design chart and a proposed design procedure are provided for practical use using the design equations for the critical shear stress approach. (Murphy-FIRL)
W74-10611

HYDRAULIC MODEL STUDIES OF THE LOW-LEVEL OUTLET WORKS, LG-2 DEVELOPMENT, QUEBEC, CANADA,
Bureau of Reclamation, Denver, Colo. Engineering and Research Center.
D. Colgate.
Available from NTIS, Springfield, Va. 22161 as PB-228 192, Price $3.25 printed copy; $2.25 microfiche. Report REC-ERC-74-3, January 1974. 26 p, 27 fig, 3 tab, 2 ref. USBR Contract 14-06-D-7406.

Descriptors: *Outlets, *Hydraulic models, *Energy dissipation, Hydraulic jump, Spillways, Hydraulics, Hydraulic design, Hydraulic equipment, *Valves, Hydraulic valves, Canada.
Identifiers: Howell-Bunger valves.

The outlet works of the LG-2 power development in Quebec were studied using a 1:16 scale model. The energy dissipator includes a deflector ring and baffle piers in a steel-lined oval section downstream from the two 96-inch Howell-Bunger valves. The energy dissipator section is followed by a flat-bottomed tunnel. Operation was improved by moving the deflector ring downstream from its original locations and substituting small floor baffles for the large baffles of the preliminary design. The elevation of the valves was satisfactory and velocities in the unlined portion of the tunnel were within acceptable limits. Data were obtained for computation of required tunnel air supply and for structural design of the deflector ring and energy dissipator walls. (Knapp-USGS)
W74-10636

AN INTEGRATED MODEL OF STORM-GENERATED WAVES,
Virginia Univ., Charlottesville. Dept. of Environmental Sciences.
For primary bibliographic entry see Field 2E.
W74-10653

SIMPLE METHOD FOR PREDICTING DISPERSION IN STREAMS,
Geological Survey, Bay Saint Louis, Miss.
For primary bibliographic entry see Field 5B.
W74-10676

8C. Hydraulic Machinery

TEST AND EVALUATION OF AN 80,000 GPD REVERSE OSMOSIS SEAWATER DESALINATION PLANT MOUNTED ON AN AMMI PONTOON,
Naval Civil Engineering Lab., Port Hueneme, Calif.
For primary bibliographic entry see Field 3A.
W74-10405

TEST AND EVALUATION OF OIL POLLUTION ABATEMENT DEVICES FOR SHIPBOARD USE, PHASE II,
Coast Guard, Washington, D.C. Naval Engineering Div.
For primary bibliographic entry see Field 5D.
W74-10444

ADVANCED X-RAY CRAWLER.
Anti-Corrosion, Vol 21, No 2, p 17, February, 1974. 1 fig.

Descriptors: *Pipelines, X-rays, *Pipes, Equipment, *Measurement.
Identifiers: *X-ray crawler, *Radiography, *United Kingdom.

Criterion Ltd. of Hitchin, Herts has built an advanced X-ray crawler for pipeline radiography of 20 in diameter pipes and above. One major feature is a central steel chassis with three afixed parts to give added strength with a rigid frame. This enables the crawler to be easily lifted into and out of pipelines. The component parts are in x-ray tube, an electric motor, a drive mechanism, an electronic brain and a rechargeable battery unit. The crawler is remotely controlled and may be dispatched in forward or reverse. (Prague-FIRL)
W74-10450

DAMAGED SEWAGE PIPE REMOVED BY DIAMOND SAWING,
Industrial Diamond Review, p 102-103, March, 1974. 4 fig.

Descriptors: *Sewers, *Pipes, *Concrete pipes, Engineering structures.
Identifiers: *Diamond sawing.

During the process of aligning eight-foot long by 108 inch od sections of concrete sewer pipe underground, one of the lead sections was accidentally damaged. The problem of removing the damaged section in the shortest possible time was solved by diamond sawing. The pipes were being aligned with hydraulic jacks when one of the units in the lead section was badly mangled. It was felt that jackhammers would be too slow. A standard wall saw unit was adapted for sawing the circular surface by a firm that specializes in sawing and drilling concrete structures. A rig was adapted to the inside of the large pipe and was operated by a two-man crew. A 20-inch diameter diamond blade made an initial slice, followed by a 26-inch blade that cut through the final two inches. The saw was powered by a nine hp motor; the blades rotated at 1400 rpm, and were water cooled. (Murphy-FIRL)
W74-10458

PRESSURE SEWER DEMONSTRATION,
New York State Dept. of Environmental Conservation, Albany.
For primary bibliographic entry see Field 5D.
W74-10463

SLURRY PUMP,
Dow Chemical Co., Midland, Mich.
M. F. Katzer, and W. G. Routson.
U.S. Patent 3,804,556. Issued April 16, 1974. Official Gazette of the U.S. Patent Office, Vol 921, No 3, p 1105-1106, April 16, 1974. 1 fig.

Descriptors: *Pumps, *Patents, *Mud, *Slurries, Silt, Pistons, Equipment.
Identifiers: Cylinders.

A two cylinder pump adaptable to pump mud and silt or other slurried material is described. While one cylinder is pumping, the other is filling with mud. Each cylinder has a piston in it which separates the mud from the hydraulic fluid (oil or oil-water). The hydraulic fluid is pumped out of one cylinder and into the other. The floating piston is drawn away from one end of the first cylinder, thereby drawing in the mud under vacuum plus the differential barometric head. At the same time an equal volume of hydraulic fluid is pumped into the other cylinder causing the piston to eject mud through a mud line. At the moment that one piston reaches one extreme of its stroke, the other one reaches the other extreme of its stroke. At this moment there is a switching of the direction of flow of the fluid and the discharge of the mud from one cylinder to the other. This fluid reversal and shifting will generally take place several times per minute. (Merritt-FIRL)
W74-10488

FILAMENT WOUND REVERSE OSMOSIS TUBES,
Secretary of the Interior, Washington, D.C. (assignee)

B. M. Riggleman, and W. L. Young, III.
U.S. Patent 3,804,259. Issued April 16, 1974. Official Gazette of the U.S. Patent Office, Vol 921, No 3, p 1029, April 16, 1974. 1 fig.

Descriptors: *Patents, *Tubes, *Reverse osmosis, *Resins, *Membranes.
Identifiers: Filaments.

An improved resin bonded filament wound support tube for membranes used in reverse osmosis processes is described. The support tube is in the form of a curved composite structure and contains at least 20-30% by weight of a thermosetting resin. The tube has interior plies of helical filament windings which result in a smooth interior surface for the tube and high strength. (Merritt-FIRL)
W74-10490

WATER PURIFYING DEVICE,
Matsushita Electric Industrial Co., Ltd., Osaka (Japan).
For primary bibliographic entry see Field 5D.
W74-10492

SAFETY INSTALLATIONS FOR THE PREVENTION OF POLLUTION THROUGH LEAKAGE IN A PIPELINE,
For primary bibliographic entry see Field 5D.
W74-10494

AUTOMATIC IRRIGATION SUPPLY SEQUENCING VALVE,
Mauna Kea Sugar Co., Hilo, Hawaii.
For primary bibliographic entry see Field 3F.
W74-10757

AUTOMATED FURROW IRRIGATION,
For primary bibliographic entry see Field 3F.
W74-10759

JET PUMP STOPS SAND CLOGGING,
Williston Water Dept., N. Dak.
B. Shaw.
Water Works and Wastes Engineering, Vol 1, No 12, p 52-53, December 1964. 2 fig.

Descriptors: *Pumps, *Screens, Surface waters, Water quality, Jets, Filtration, Treatment facilities.
Identifiers: *Jet pumps, *Sand clogging, Traveling screen, Filtration plant.

The construction and installation are described of a large jet pump at a filtration plant located 30 miles downstream from the confluence of the Yellowstone and Missouri Rivers. The Yellowstone River introduces a large amount of suspended particles into the Missouri at their confluence and it becomes necessary to contend with and ultimately filter the debris at water plants below the confluence. In conventional pump systems, heavy sand settling in the well completely clogs the traveling screen and it becomes ineffective in freeing the well of floating debris. The installation of a jet pump alleviates the problem. The jet pump uses an agitator system of high water pressure that frees the intake line of debris, unclogs the traveling screen, and at the same time, moves floating debris into the screen. (Campbell-NWWA)
W74-10831

READING PUMP CURVES,
Oklahoma State Univ., Stillwater.
R. N. DeVries.
Journal of the American Water Works Association, Vol 65, No 6, p 442-444, June 1973. 4 fig.

Descriptors: *Pressure, Impellers, Pumps, Turbines, Centrifugal pumps, *Curves.
Identifiers: *Pump curves.

Pump curves are an invaluable aid in the selection and operation of pumps. The reading and comprehension of these curves are not difficult once a basic understanding of pump-curve terms and their interrelationships has been gained. When using pump curves for selecting a pump, the operator should look first at the steepness of the head-capacity curve. He should match the slope to his situation. For example, if he has requirements for variable discharges and discharge pressure, he should use a pump with a steep curve. Conversely, a pump with a flat curve should be used for constant discharge and head conditions. Secondly, the operator should look at the power and efficiency curves. The pump operates most efficiently in a small range of discharges. If a pump cannot be found to fit the requirements at the common motor speed, then the operator should look at other speeds or a variable-speed-drive motor. (Staplin-NWWA)
W74-10833

WELL AND PUMP CORROSION,
Layne and Bowler, Inc., Memphis, Tenn. Layne Research Div.
For primary bibliographic entry see Field 8G.
W74-10837

WELLSITE DIAGNOSIS OF PUMPING PROBLEMS USING MINICOMPUTERS,
K. G. Gibbs, and R. H. Nolen.
Journal of Petroleum Technology, Vol 25, p 1319-1323, September 1973. 6 fig, 2 tab, 11 ref.

Descriptors: Pumping, Computers, *On-site tests.
Identifiers: Sucker rod diagnosis, *Minicomputers, Wellsite diagnosis, Pumping problems, *Down-hole conditions, Surface data.

A truck-mounted computer system greatly enhances the efficiency of the sucker rod technique at the wellsite. A brief theoretical review of the diagnostic technique which uses surface data to deduce down-hole conditions is presented, and the computer hardware used in the analysis is described. Examples include: the analysis of surface equipment; the analysis of rod loading; the evaluation of down-hole pump conditions; and, the determination of well potential. The main advantage of this system is that it offers definitive and timely results that can be obtained efficiently, and at a low cost of application. (Campbell-NWWA)
W74-10840

TURBINE CHECK-OUT MADE SIMPLE,
R. L. Jerry.
Water and Pollution Control, p 44-45, March 1966.

Descriptors: *Steam turbines, *Maintenance, Repairing.
Identifiers: *Turbine check-out.

Steam turbines, in good operating order, are almost silent and devoid of tremor and vibration. Presence of either is a signal for immediate shutdown to prevent further damage. After shutdown, the turbine should be stripped and checked-out for damage and excessive wear. Stripping a steam turbine is relatively problem free, provided there is sufficient hoist and overhead crane equipment to accommodate removal of the housing top. Removal of the housing cover exposes the rotors, stator, thrust collar and bearing assemblies. Both the front and rear bearing assemblies should be checked for wear, and the thrust collar checked for tightness. In particular, the flanges within the bearing assembly should be checked for irregularities and nicks. The check-out should proceed with the removal of the main shaft exposing the lower bearing halves. Turbine vanes should be inspected for wear and residue coating. During reassembling of the turbine, care should be taken to equalize flange stresses, and to replace all gaskets. (Campbell-NWWA)
W74-10841

PUMP SELECTION - A MANUFACTURERS VIEWPOINT,
R. F. Dennis.
Water and Pollution Control, p 36, September 1966. 1 fig.

Descriptors: *Pumps, *Centrifugal pumps, *Hydraulic equipment, Hydraulics.
Identifiers: *Pump selection, System head curve, Performance curve, Net positive suction head.

To obtain the proper centrifugal pump for an individual well, it is essential to supply the manufacturer with the following facts: (1) type of service; (2) material to be pumped; (3) amount and size of solids; (4) operating temperature; (5) operating pressure; (6) capacity; and, (7) head. In particular, the best pump for a given job is critically dependent upon the system head curve (S.H.C.). The proper pump selection is made by comparing the S.H.C. to the performance curve. The pump rating is the point of intersection of S.H.C. and performance curve. Often pumps fail to meet design conditions because there is insufficient net positive suction head available. To insure that no cavitation, air binding, loss of prime, or erosion of impeller and casing occur, the net positive suction head available must be at least equal to, or greater than that required by the pump. (Staplin-NWWA)
W74-10842

CORROSION CONTROL ON BOREHOLE WATER PUMPS,
Water Planning for Israel Ltd., Tel-Aviv.
For primary bibliographic entry see Field 8G.
W74-10844

ELECTRICALLY GROUNDED FRP SYSTEMS,
FMC Corp., Front Royal, Va.
J. H. Mallinson.
Materials Protection and Performance, Vol 13, No 12, p 26-28, December 1973. 2 tab, 4 ref.

Descriptors: Electric currents, Conductivity, Conductors, *Electrical grounding, Electrical conductance, Plastics.
Identifiers: *Fiberglass(Reinforced plastic), Electrically grounded laminates.

The nature of electrically grounded laminates is described and results are outlined of preliminary tests on a graphite fiber corrosion resistant laminate. Liquids flowing through a pipe often generate static electricity. If the charge is sufficient, a spark will jump to a source of lower potential, and become a source for an explosion if volatile gases or vapors are present. Many processes involving heavy humidification constantly cover all surfaces with a film of water, providing the system with a potential natural ground. However, to totally rely on wetted surfaces as a ground can be dangerous. The safest course is to provide for a complete and adequate ground regardless of the degree of humidification, or the conductivity of existing solutions in contact with the structure. Experience has shown that the nonconductive, fiberglass reinforced plastic (FRP) laminates used on many tanks and duct systems can be electrically grounded by adding finely ground carbon to the resin system. (Martino-NWWA)
W74-10845

ROCK CUTTING BY IMPACT ACTION,
Nottingham Univ. (England). Dept. of Mining Engineering.
B. N. Whittaker, and A. B. Szwilski.
International Journal of Rock Mechanics, Mineral Science and Geomechanical Abstracts, Vol 10, p 659-671, 1973.

Descriptors: Rock properties, *Rock mechanics, Rock excavation, Tensile stress.
Identifiers: Rock cutting, *Impact ripping, Impact cutting, Linear cutting, *Tensile splitting theory.

The principles of rock cutting are reviewed and differentiation made between linear and impact cutting. Theoretical aspects of cutting are discussed with particular reference to the tensile splitting theory. The role played by the rock fabric in relation to its cutting characteristics is examined. Consideration is given to how a rock's impact cutting property can be established and to this end a description is given of an experimental rig designed to test different rock types. Results from a study with the impact cutting rig are presented and discussed. It is concluded that this form of test is of great value in comparing the impact cutting properties of different rocks. The practical implications of the results are discussed, in particular their bearing on the design aspects of current rock cutting machines. (Campbell-NWWA)
W74-10847

A THEORY OF HYDRAULIC ROCK CUTTING,
Flow Research, Inc., Kent, Wash.
S. C. Crow.
International Journal of Rock Mechanics, Mining Science and Geomechanical Abstracts, Vol 10, p 567-584, 1973. 8 fig, 11 ref.

Descriptors: Rock excavation, Rock properties, Permeability, Cavitation, Fluid mechanics, Pressure, *Hydraulics.
Identifiers: *Water jets, Jet stream, *Wilkeson sandstone, Grains, *Hydraulic rock cutting.

Water jets having total pressures above 1000 atm are attractive tools for cutting rock. A theory is developed to explain the cutting action. The rock is assumed to translate at a speed under a continuous jet. The problem is to determine the depth of the resulting slot as a function of feed rate, diameter and total pressure of the jet, and the relevant properties of the rock. The jet exerts traction against a cutting surface at the leading edge of the slot, and the traction induces continuous fracture. Cavitation tends to sheath the cutting surface in vapor, but curvature of the jet stream causes a high surface pressure, which closes the cavity bubbles and exposes the grains to direct impact from the water. The surface pressure would suffice to keep the grains in place, but permeability allows the water to penetrate beneath the cutting surface and relieve the pressure across the grains. A theory is presented for the intrinsic speed of rock-cutting, once permeability has occurred. The theory is compared to preliminary data spanning a three-decade range of feed rate, and the comparison is highly encouraging. (Staplin-NWWA)
W74-10848

FOOTAGE, TRIP TIME ARE FACTORS IN CHOICE OF DOWNHOLE MOTORS,
E. V. Petersen.
Oilweek, Vol 24, No 42, p 32, 36, 38, 44, December, 1973. 3 fig, 2 tab.

Descriptors: *Drilling, *Drilling equipment, *Turbines, Drill holes, *Canada.
Identifiers: *Dyna-Drill, *Turbo-drills, *Downhole motors, Directional drilling.

The increased use of downhole motors for drilling operations in Canada is discussed. Recently, there has been a considerable increase in the use of turbo-drills and Dyna-Drills in both directional and straight hole drilling. The main advantages offered by downhole motors are faster penetration, considerably less trip time, and better hole control. The Dyna-Drill offers many advantages over most turbines. It has simplicity of design; it can operate at lower rpm's to utilize ordinary rock bits; it requires less cash outlay; and, it is more effective in directional drilling operations. However, the Dyna does not operate well with oil-base muds, and its all-steel bearings have a shorter life than the rubber-steel bearings of the turbines. The higher operating costs of turbo-drills is commonly offset by the two to four fold increase in penetration rate that is often realized. (Campbell-NWWA)
W74-10854

VERTICAL TURBINE PUMPS - PART 2: IMPELLER AND CHARACTERISTIC CURVES,
Orange County Flood Control District, Santa Ana, Calif.
J. W. Williams.
Water and Sewage Works, Vol 116, No 4, p 127-129, April, 1969. 1 fig.

Descriptors: *Turbines, Pumps, Impellers.
Identifiers: *Turbine pumps, *Vertical turbines.

The effect of impeller configuration on the overall operation and efficiency of turbine pumps is discussed. Impeller configurations close to a radial position contrast with axial impellers in that they develop more head, have a flatter head capacity curve, and have a rising horsepower curve. Pumps with radial impeller configurations are more suited to deal with varying system demands without significant loss of pressure. Pumps with axial impeller configurations are more suited to deal with systems where the capacity remains unchanged. The vertical turbine is considered to have an optimized impeller design when compared with that of axial and radial designs. The vertical turbine has the advantage over other impeller designs in that the head requirement is no longer a consideration, and the horsepower curve is quite flat. Impellers may also be classified as either a semi-open or enclosed type. As compared to semi-open impellers, the enclosed impellers are relatively insensitive to vertical impeller positioning, and develop much less unbalanced thrust. For these reasons, the enclosed impeller is more satisfactory in deep settings where lineshaft stretch is a problem. (See also W74-10856 and W74-10857) (Martino-NWWA)
W74-10855

VERTICAL TURBINE PUMPS - PART 3: THRUST,
Orange County Flood Control District, Santa Ana, Calif.
J. W. Williams.
Water and Sewage Works, Vol 116, No 5, p 177-179, May, 1969. 1 tab.

Descriptors: *Turbines, Pumps, Impellers.
Identifiers: *Turbine pumps, *Vertical turbines, Lineshaft stretch, Impeller design.

The development of down-thrust in turbine pumps is discussed and down-thrust is related quantitatively to impeller design and classification. Down-thrust, which is the difference in pressure and surface area between the top and bottom of the impeller, is less for an enclosed impeller than for a semi-open impeller. Upthrust, which is caused by the change in direction of flow as the fluid moves through the impeller, is greatest for a radial-flow impeller, and smallest for an axial-flow impeller. If the amount of down-thrust achieves some critical value, a certain amount of lineshaft stretch occurs forcing the impellers against the bottom of the bowls causing vibration and impeller wear. Enclosed impellers are not greatly affected by vertical movement whereas semi-open impellers are quite sensitive to lineshaft stretch. Speed is an important consideration in pump selection. High speed results in the need for fewer pump stages, the size of the motor is reduced, and the torque can be better transmitted, all resulting in lower initial cost. Higher speed pumps are sometimes a disadvantage because they require a high Net Positive Suction Head. Vertical turbines, in contrast to horizontal turbines, have an advantage in that they can operate at high speeds with a small Net Positive Suction Head. (See also W74-10855) (Staplin-NWWA)
W74-10856

VERTICAL TURBINE PUMPS - PART 4: WELL CHARACTERISTICS,
Orange County Flood Control District, Santa Ana, Calif.
J. W. Williams.
Water and Sewage Works, Vol 116, No 6, p 226-227, June, 1969. 11 ref.

Descriptors: *Turbines, *Pumps, Performance.
Identifiers: Well characteristics, *Vertical turbines, Horizontal split-case pumps.

How well characteristics influence pump performance is described and the overall characteristics of vertical turbines and horizontal split-case pumps are compared. To optimize pump performance, it is suggested that the amount of lineshaft deflection be minimized; the velocities of water entering the well be limited to prevent sand production; the pump not be placed below the perforations; and, the amount of drawdown in unconsolidated formations be limited. The vertical turbine pumps offer the following advantages over typical horizontal split-case pumps: a smaller motor can be used with a vertical turbine; less floor space is needed; piping arrangement is simplified; no suction pipe is needed; stages may be added or subtracted; and, freeze protection is minimized. The vertical turbine has the following disadvantages: pump bearings are more susceptible to corrosion; inaccessible for maintenance; major pump stripping is necessary to expose the bowls, and, the vertical turbines cannot operate at a high efficiency over a wide range of speed. (See also W74-10855) (Campbell-NWWA)
W74-10857

HOW GEOTHERMAL WELLS ARE DRILLED AND COMPLETED,
Big Chief Drilling Co., Oklahoma City, Okla.
For primary bibliographic entry see Field 8A.
W74-10860

8D. Soil Mechanics

CLASSIFICATION, ENGINEERING PROPERTIES AND FIELD EXPLORATION OF SOILS, INTACT ROCK AND IN SITU ROCK MASSES,
Newmark (Nathan M.) Consulting Engineering Services, Urbana, Ill.
For primary bibliographic entry see Field 8E.
W74-10356

REGIONAL LANDFILL AND CONSTRUCTION MATERIAL NEEDS IN TERMS OF DREDGED MATERIAL CHARACTERISTICS AND AVAILABILITY: VOLUME I: MAIN TEXT; VOLUME II: APPENDIXES,
Green Associates, Inc., Towson, Md.
For primary bibliographic entry see Field 5G.
W74-10624

THE EFFECTS OF WATER CONTENT AND DENSITY ON THE ELECTRICAL RESISTIVITY OF SOIL,
Brooklyn Coll., N.Y. Dept. of Geology.
For primary bibliographic entry see Field 2G.
W74-10829

8E. Rock Mechanics and Geology

CLASSIFICATION, ENGINEERING PROPERTIES AND FIELD EXPLORATION OF SOILS, INTACT ROCK AND IN SITU ROCK MASSES,
Newmark (Nathan M.) Consulting Engineering Services, Urbana, Ill.
W. J. Hall, N. M. Newmark, and A. J. Hedron, Jr.
Available from Sup Doc, GPO, Washington, D.C. 20402, Price $2.70. Atomic Energy Commission Directorate of Regulatory Standards Contract Report WASH-1301, May 1974. 256 p, 59 fig, 7 tab, 76 ref, append. USAEC Contract AT(49-5)-2667.

Descriptors: *Engineering geology, *Nuclear powerplants, Civil engineering, Safety, Public

health, Design, Foundation investigations, Soil investigations, Geology, Geologic investigations, On-site investigations, *Rock mechanics, *Soil mechanics.

Engineering properties of soil and rock materials are classified and described as they pertain specifically to nuclear reactor facility investigations. The procedures commonly employed in determining the classification and engineering properties of soils are given. Interpretation of the results of triaxial tests, determination of stress and strain properties, classification and engineering properties of intact rock and in situ masses, and exploration and evaluation procedures for both soils and rock are discussed. (Knapp-USGS)
W74-10356

AN EXPERIMENTAL MEASUREMENT OF IN SITU STRESS IN GRANITE BY HYDRAULIC FRACTURING,
Los Alamos Scientific Lab., N. Mex.
R. L. Aamodt.
Available from NTIS, Springfield, Va 22161 as LA-5605-MS Price $4.00 printed copy; $2.25 microfiche. Informal Report LA-5605-MS, California University, April 1974. 4 p, 2 fig, 8 ref. AEC Contract W-7405-Eng. 36.

Descriptors: *Rock mechanics, *Fractures(Geologic), *Fracture permeability, Cracks, Granites, Pressure, Hydrostatic pressure, Mechanical properties.
Identifiers: *Hydraulic fracturing.

Hydraulic-fracturing experiments were carried out in a 785-m wellbore drilled 145 m into granite. The energy required to create and then to reopen one fracture was determined by integrating the pressure-volume curves. A value of 100 Joules per sq m was obtained for the apparent surface energy of the granite. Two values of 14.7 MPa and one of 13.7 MPa were obtained for the least principal earth stress by independent methods. In a later experiment, a large volume (4000 liter) fracture was formed under pressure sufficient to raise the overburden. The pressure history of this fracture after shut-in indicates that an almost horizontal fracture was opened, as well as a vertical one. (Knapp-USGS)
W74-10663

TUNNELS--MACHINE EXCAVATION RATE OF PROGRESS--MACHINE DATA,
Bureau of Reclamation, Denver, Colo. Engineering and Research Center.
Available from NTIS, Springfield, Va 22161 as REC-ERC-74-7 Price $3.00 printed copy; $2.25 microfiche. Report 74-7, May 1974. 12 p.

Descriptors: *Tunneling machines, *Tunneling, *Tunnels, *Excavation, *Tunnel construction, Equipment, Construction equipment, Rock mechanics.

Information on 12 machine-bored water tunnels constructed by the Bureau of Reclamation is presented graphically and pictorially. Machine data, rates of progress, tunnel profiles, and rock types and strengths are given for each tunnel. The bored diameters of these tunnels vary from 9 to 21 feet. Rocks encountered in boring were shale, sandstone, conglomerate, quartzite, limestone, siltstone, granite porphyry, granite gneiss, gneissic granodiorite, rhyolite, rhyodacite, and agglomerate. The compressive strengths of these rocks were 300 to 38,000 psi. The boring rates of the machines used varied from 17 to 107 feet for the average calendar day. The maximum progress was 403 feet 1 three-shift day. This rate was attained in 17.3 hours of machine time while boring an 8-foot 7-inch finished-diameter tunnel through shale having a maximum compressive strength of 6,000 psi. (Knapp-USGS)
W74-10680

UNDERGROUND STORAGE OF NATURAL GAS IN ILLINOIS-1973,
Geological Survey, Urbana, Ill.
T. C. Buschbach, and D. C. Bond.
Illinois Petroleum 101, 1974. 74 p, 43 fig, 33 tab, 50 ref.

Descriptors: *Underground storage, Storage capacity, Reservoir storage, Natural gas, *Illinois.
Identifiers: *Natural gas storage.

Natural gas is stored in underground reservoirs at 37 locations in Illinois. These reservoirs contain more than 580 billion cubic feet of gas, about one-third of which is working gas and two-thirds is cushion gas. Potential usable capacity of these reservoirs is estimated to be 1.2 trillion cubic feet. At 11 of the storage projects, gas is stored in depleted, or partially depleted gas reservoirs; one depleted oil reservoir is used for storage; in the remaining projects, gas is stored in aquifers that originally contained no hydrocarbons in commercial quantities. At four locations, two reservoirs at different depths are in various stages of exploration, testing, or development for storage. Two projects have been abandoned. Rocks of all systems from Cambrian to Pennsylvanian are used for storage of gas in Illinois. Most of the storage volume, however, is in sandstone aquifers of Cambrian and Ordovician age. A brief discussion is included of some of the technology associated with the underground storage of natural gas. Also included is information on the geologic setting and the history of development of each project. (Campbell-NWWA)
W74-10834

THE USE OF ENTIRE APPARENT RESISTIVITY CURVES FOR INTERPRETATION OF NORMAL RESISTIVITY LOGS,
Colorado School of Mines, Golden. Dept. of Geophysical Engineering.
T. D. Ozcandarli.
M Sc Thesis, May 1969. 104 p, 19 fig, 11 ref, 2 append.

Descriptors: *Resistivity, Bedrock, Beds, Sedimentary rocks, Lithology, *Aquifer characteristics, *Groundwater, *Borehole geophysics.
Identifiers: Apparent resistivity difference, *Bed thickness, Empirical relations, Transformation.

An empirical method is developed for construction of the apparent resistivities, derivatives of apparent resistivities, for beds of finite thickness, and of finite resistivity in the presence of a borehole from the same quantities corresponding to a bed of same thickness but of infinite resistivity. When the derivatives of apparent resistivities corresponding to beds of finite resistivities are cross-plotted against that of an infinitely resistive bed, a linear relation is obtained. The slope of the line is the same for a given resistivity no matter what the thickness of the bed is. A new quantity called 'apparent resistivity difference,' is introduced. Cross-plots are developed for interpretation of 'normal' resistivity logs. Certain distinctive points on these plots indicate the position of the bed boundaries and can be used to estimate the bed thickness with an error of less than one inch. Since an empirical relation for transformation of the derivatives and of apparent resistivity differences from one bed thickness to another is available, it is possible to compare the resistivities of the same bed in two wells even if their thicknesses are different. (Campbell-NWWA)
W74-10835

ELECTRIC AND CALIPER LOGS AS LITHOLOGIC INDICATORS IN VOLCANIC ROCKS, NEVADA TEST SITE,
Geological Survey, Denver, Colo.
For primary bibliographic entry see Field 8G.
W74-10836

APPLICATIONS OF INHOLE GEOPHYSICAL LOGS IN VOLCANIC ROCKS, NEVADA TEST SITE,
Geological Survey, Denver, Colo.
For primary bibliographic entry see Field 8G.
W74-10846

ROCK CUTTING BY IMPACT ACTION,
Nottingham Univ. (England). Dept. of Mining Engineering.
For primary bibliographic entry see Field 8C.
W74-10847

A THEORY OF HYDRAULIC ROCK CUTTING,
Flow Research, Inc., Kent, Wash.
For primary bibliographic entry see Field 8C.
W74-10848

8F. Concrete

COMPRESSIVE STRENGTH OF 67-YEAR OLD CONCRETE SUBMERGED IN SEAWATER,
Naval Civil Engineering Lab., Port Hueneme, Calif.
H. H. Haynes, and P. C. Zubiate, Jr.
Available from NTIS, Springfield, Va 22161 as AD-772 527 Price $3.00 printed copy; $2.25 microfiche. Technical Note N-1308, October 1973. 8 p, 4 fig, 2 tab, 5 ref.

Descriptors: *Compressive strength, *Concrete testing, *Sea water, Weathering, Breakwaters, *California, Concretes.
Identifiers: Los Angeles Harbor(Calif).

Concrete blocks submerged partly or totally in seawater for 67 years off the Los Angeles Harbor breakwater were cored to test compressive strength. The compressive strengths of the blocks were compared with strengths measured 40 years earlier. Two blocks increased in strength, three remained the same and one decreased. The blocks still showed fairly sharp edges and original form marks. Rock-boring mollusks were found on the surface of the blocks but they did not damage the concrete. (Knapp-USGS)
W74-10402

SHOTCRETE AT MEXICO CITY,
R. E. Mason.
Tunnels and Tunnelling, Vol 6, No 2, p 59, 61-62, March, 1974. 5 fig, 2 ref.

Descriptors: *Tunnel construction, *Tunne l design, *Tunnelling, *Gunite, Engineering structures, Drainage systems, *Mexico.
Identifiers: *Shotcrete.

The Mexico City drainage system includes 102 km of tunnels, in which there are two interceptors and an outfall. Most excavation was done by conventional methods with a horseshoe tunnel section. The geology is characterized by bentonites, lacustrine sandy and silty deposits, volcanics, and hard clays. The lacustrine deposits are very changeable (heavy water flows in sandy beds, fractures in the more blocky areas) and provided difficulty in tunnelling. The volcanics (rhyolotes, dacites, andesites, basalts) were blocky or highly fractured and were sometimes accompanied by mylonization. Major faults were accompanied by hydrothermal alteration. The hard clays were often weakened by shear or were in some areas blocky. Shotcrete was used in the tunnelling to increase the rate of operations. Fifty-one spraying machines and 48 mixer-transporter cars sprayed over 200,000 cubic meters of shotcrete dry-mix by mid 1973. In the volcanics, the Swedish method of shotcrete support was utilized -- covering the rock surface with a thin shotcrete coat and filling in corners and fractures; while in the lacustrine deposits systematic patterns of fully-grouted, untensioned anchors were used in addition to the shotcrete.

When montmorillonite clays were encountered shotcrete and full section steel sets were used to resist swelling pressures. The shotcrete dry-mix was composed of aggregates, cement and additives. Under difficult conditions a fast-setting coat was applied followed by normal structural shotcrete. Heavy water flows were dealt with by drainage tubes and drain holes. (Murphy-FIRL)
W74-10452

DAMAGED SEWAGE PIPE REMOVED BY DIAMOND SAWING,
For primary bibliographic entry see Field 8C.
W74-10458

PIPE JACKING -- A TECHNIQUE FOR SOFT GROUND TUNNELLING,
Cementation Co. Ltd., Calcutta (India).
For primary bibliographic entry see Field 8A.
W74-10821

ACCELERATED CURING OF CEMENTITIOUS SYSTEMS BY CARBON DIOXIDE, PART II. HYDRAULIC CALCIUM SILICATES AND ALUMINATES,
Illinois Univ., Urbana. Dept. of Civil and Ceramic Engineering.
R. L. Berger, and W. A. Klenn.
Cement and Concrete Research, Vol 2, No 6, p 647-652, November 1972. 2 tab, 8 ref.

Descriptors: Calcium compounds, Carbon dioxide, Chemical reactions, *Silicates, *Cements.
Identifiers: *Calcium silicates, *Calcium aluminates, Strength development, Strength gain, Water/solids ratio.

The treatment of Ca3SiO5, Beta-Ca2SiO4, Ca3Al206, and Ca12Al14033 low water/solids ratio compacted pastes with carbon dioxide immediately after preparation resulted in a rapid strength development of the calcium silicates and a negligible strength development of the calcium aluminates. The strength gain after 5 min. of carbon dioxide treatment was over 3,000 psi for both the Ca3SiO5 and Beta-Ca2SiO4 pastes. There was no apparent difference between the rate of reaction of the Ca3SiO4 pastes as based on strength gain characteristics. (Staplin-NWWA)
W74-10849

THE PARTITION OF CALCIUM AMONG CEMENTING COMPOUNDS IN AGING HIGHWAY CONCRETES,
Iowa State Univ., Ames.
D. E. Simon.
M Sc thesis 1968. 82 p, 12 fig, 2 tab, 41 ref, 2 append.

Descriptors: *Cements, *Concretes, Portland cements, *Aging(Physical), Durability, Deterioration, *Grouting, Petrology, *Calcium, *Iowa, Highways.
Identifiers: Chemical processes, Physical processes, Fine aggregate fractions, Coarse aggregate fractions, Hydrated cement fractions, *Cementing.

The purpose was to verify by means of a chemical study petrographic evidence that changes occur in aging concretes. The chemical investigation of the hydrated cement portion of the matrix was designed to obtain data which would be of maximum use. This approach necessitated development of several techniques, such as a chemical partition of silica and insoluble residue contents, a calcium balance of the major phases present in the hydrated cement and a method of recalculating the chemical data to an additive basis. Prior investigations generally have considered all Type I cements to be a material with approximately uniform phase composition, and did not distinguish between different brands or sources of cement. However, techniques used in this investigation emphasize that the chemical data are dependent on the source of cement and therefore the cement source is critical in any interpretation of concrete performance. Results of this study substantiate by chemical methods petrographic evidence observed by other investigators that the hydrated cement portion of concrete changes with age. In addition, this study provides a general path by which chemical reactions related to aging follow to account for the observed changes, as well as a chemical background for understanding these changes in concrete deterioration. (Campbell-NWWA)
W74-10853

THE CHANGE IN REACTIVITY OF SILICATE ANIONS DURING THE HYDRATION OF CALCIUM SILICATES AND CEMENT,
Central Research and Design Inst. for Silicate Industry, Budapest (Hungary).
F. D. Tamas, and M. Fabry.
Cement and Concrete Research, Vol 3, No 6, p 767-776, 1973. 2 fig, 2 tab, 20 ref.

Descriptors: *Silicates, *Hydration, Chemical reactions, *Cements, *Anions.
Identifiers: Tricalcium silicate, Beta-tricalcium silicate, Portland cement.

The change in reactivity of the silicate anion complex of tricalcium silicate, beta-dicalcium silicate and portland cement during hydration was studied by measuring the rate constant (k) of the silicomolybdic acid formation. The three anhydrous starting materials have identical k values indicating their identical monosilicate anion structure. During hydration the value of k decreases continuously; the rate of decrease of k is highest in case of cement and lowest in case of beta-dicalcium silicate. The decrease of k can be attributed to the formation of bridging oxygen ions in the silicate complex. k tends to reach a final, limiting value; beyond this k can still be decreased by special techniques as, e.g., by regrinding and rehydrating the hardened samples. (Campbell-NWWA)
W74-10859

8G. Materials

SNOW ROAD CONSTRUCTION TECHNIQUE BY LAYERED COMPACTION OF SNOW-BLOWER PROCESSED SNOW,
Naval Civil Engineering Lab., Port Hueneme, Calif.
M. W. Thomas, and K. D. Vaudrey.
Available from NTIS, Springfield, Va 22161 as AD-767 637, Price $2.75 printed copy; $2.25 microfiche. Technical Note N-1305, August 1973. 13 p, 7 fig.

Descriptors: *Snow, *Road construction, *Antarctic, *Construction materials, Road design, Cold weather construction, Compaction, Cold regions, Polar regions.

Techniques developed by the Naval Civil Engineering Laboratory (NCEL) for constructing snow roads were studied to find simpler methods. Elevated high-strength snow roads are constructed over the deep snowfields in Antarctica between McMurdo Station and the Williams Field complex to move cargo and personnel in rubber-tired vehicles. To achieve this objective, new cutterheads were installed on a ski-mounted snowblower and the pulverized snow was deposited and spread in 4-inch layers which were compacted by tractors. This new method eliminates special ski-mounted snow mixers, a savings of both costly equipment and construction time. Test results show that the experimental snow road densities and shear strengths compare favorably with those of previous roads built by pulvimixing. The experimental test section held up under two months of wheeled traffic, proving that snow roads built by the new construction technique will give satisfactory service. (Knapp-USGS)
W74-10403

THE INFLUENCE OF THE CHEMICAL NATURE OF POLYMERS ON THEIR DRAG REDUCTION CHARACTERISTICS,
Hydronautics, Inc., Laurel, Md.
For primary bibliographic entry see Field 8B.
W74-10427

PIPE INSPECTION CAMERAS AND TECHNIQUES,
Photo Data Inst., Janesville, Wis.
D. W. Hyzer.
Pollution Engineering, Vol 6, No 6, p 37-40, June, 1974. 4 fig, 4 tab.

Descriptors: Sewage treatment, *Water pollution control, Environmental sanitation, Sanitary engineering, Excavation, *Photography, *Cameras, Infiltration rates.
Identifiers: *Closed-circuit television, Photographic cameras, *Pipe inspection.

Growing public concern over environmental pollution has placed new demands on internal sewer-line inspection procedures. Smoke testing, rodding, and lamping were considered sufficient only a few years ago but have been outmoded by the more effective optical techniques available today. Film and video methods make it possible for the engineer to pinpoint problem areas and eliminate guesswork concerning the condition of new and old installations. Infiltration rates can be estimated, so that proper control measures can be undertaken. Accurate location data help minimize excavation costs when corrective repairs are required. Various inspection systems are described. Optical pipe-inspection equipment can be classed into two basic systems: (1) closed-circuit television and (2) photographic cameras. In the past, video methods have been more widely used than photography in pipe-inspection applications, but escalating costs and new documentation requirements are expected to increase the use of photography in the future. (Martino-NWWA)
W74-10828

RESISTIVITY METHODS IN PROSPECTING FOR GROUND WATER,
Kansas State Univ., Manhattan. Dept. of Geology.
For primary bibliographic entry see Field 4B.
W74-10832

ELECTRIC AND CALIPER LOGS AS LITHOLOGIC INDICATORS IN VOLCANIC ROCKS, NEVADA TEST SITE,
Geological Survey, Denver, Colo.
R. P. Snyder.
The Geological Society of America, Memoir 110, p 117-124, 1968. 7 fig, 1 ref.

Descriptors: *Borehole geophysics, Electrical studies, *Well logging, *Electrical well logging, Igneous rocks, Lithologic logs, Nevada.
Identifiers: *Nevada test site, *Lithologic indicators, Caliper logs, Electric logs.

Electric logs are being used on Pahute Mesa at the Nevada Test Site for preliminary identification of volcanic rock units penetrated by drill holes. Induced and produced water in the drill holes have essentially the same resistivity, so the spontaneous potential curve is negated. In general, resistivities are lowest in the bedded tuffs and increase proportional to welding in ash-flow tuffs, and are greatest in rhyolitic lava flows. Caliper logs can be used to locate lithologic zones which will tend to slough or cave. These zones are the poorly indurated ash-fall tuffs, vitric and highly fractured ash-flow tuffs and rhyolites. Zeolitized ash-flow and ash-fall tuffs and unfractured rhyolites are competent. (Staplin-NWWA)
W74-10836

WELL AND PUMP CORROSION,
Layne and Bowler, Inc., Memphis, Tenn. Layne Research Div.

K. E. Moehrl.
Water and Wastes Engineering, Vol 3, No 2, p 54-56, February 1967.

Descriptors: *Corrosion, *Corrosion control, Cavitation, Chemical reactions, Economics, Bacteria, *Pumps.
Identifiers: *Pump corrosion, *Corrosion prevention.

Factors that determine the extent and rate of pump corrosion are discussed. These factors include installation type, construction materials, water characteristics, operation methods, and well location. Specific causes of corrosion such as acid waters, bacterial growth, galvanic corrosion, cavitation erosion, impingement erosion, and crevice corrosion are discussed in detail. The control and prevention of pump corrosion is presented as a unique problem at each well site. Thus, the specific preventive and curative procedures to be used will depend upon the cost of installation, equipment, operation, and maintenance. The most effective program of corrosion prevention should include an early analysis of the potential aquifer, good well and pump design, proper selection of materials and sound maintenance. (Martino-NWWA)
W74-10837

RADIOACTIVE ISOTOPES FOR WATER-INPUT PROFILES,
J. M. Edwards, and L. E. Holter.
The Oil and Gas Journal, Vol 53, No 30, p 69-70, November 29, 1954. 3 fig.

Descriptors: *Injection, *Radioactive isotopes, Tracers, Borehole geophysics, Telemetry.
Identifiers: *Isotope injection, Water-input profiles.

A method for determining the subsurface intervals that are being invaded by injection water is described. This method makes use of the radioactive isotope injection technique in combination with conventional gamma-ray logging. In this method, a radioactive slug is injected into the formation above a scintillometer and the time interval for the slug to travel from the injection point to the counter is recorded. The velocity of the injection fluid through the bore hole can be calculated from the injection data. Besides measuring velocity, the method also records any decrease in radioactive intensity at the scintillometer that might reflect loss of fluid into the formation. A method is described whereby the relative amounts of fluid entering each sand may be calculated using data from radioactive injection. (Staplin-NWWA)
W74-10838

CORROSION CONTROL EXTENDS LIFE OF INCREASINGLY EXPENSIVE WATER WELLS,
Layne Associates, Memphis, Tenn.
F. Dorr, Jr., and A. L. Williams, Jr.
Water and Sewage Works, Vol 116, No 11, p 377-380, November 1969. 6 fig.

Descriptors: *Corrosion, *Corrosion control.
Identifiers: Cathodic protection.

Corrosion has been found to be the single most significant factor influencing a well's failure. Corrosion is related to the flow of direct current electricity from the metal into the natural environment. The corrosion occurs at the point where the current flows away from the metal, carrying particles of the metal into the soil or water. An effective means of preventing this kind of corrosion is to prevent the current from leaving the metal. Corrosion control is afforded water wells at one or all three of the following points: (1) electrolysis corrosion, which is combated through electrical isolation; (2) column piping and internal casing corrosion, which is combated with cathodic protection using sacrificial galvanic anodes; and, (3) external surface area corrosion of casing and filter screen which is combated with cathodic protection. The steps required in the performance of a professionally engineered corrosion control program consist of: (1) preliminary engineering survey; (2) engineering design and cost proposal; (3) acceptance and installation; and, (4) check-out and certified engineers report. (Staplin-NWWA)
W74-10839

PRACTICAL FUNDAMENTALS FOR FIELD USE OF INSTRUMENTS AND EQUIPMENT,
J. R. Cowles.
Materials Protection and Performance, Vol 12, No 1, p 25-31, January 1972. 3 fig.

Descriptors: *Corrosion control, *Potentiometers, Equipment, Resistance, Resistivity, *Cathodic protection.
Identifiers: Field instruments, *Cathodic protection instruments.

Basic characteristics are outlined of cathodic protection instruments, primarily as applied to underground structures. Emphasis is placed on the reasons that certain varieties of meters are used, and the limitations that are imposed by the resolution of the meters. Most instruments used in cathodic protection must be operated by very small amounts of power so that their design must be pushed to practical limits. These instruments must also have a high sensitivity because many of the processes being monitored involve minute wattages. The sensitivity of any DC meter is a function of the area which the moving coil encompasses, and the pivot and jewel friction. The equipment used by most corrosion engineers should consist of a galvanometer, ammeter, AC resistivity meter, taut bond meter, and a voltmeter. The voltmeter chosen should have a high ohm per volt rating to ensure high sensitivity. The adverse conditions often encountered by corrosion engineers makes the potentiometer voltmeter more appropriate. The care of most instruments should be directed at minimizing the amount of handling, travel, and jarring that the meter is subjected to. (Staplin-NWWA)
W74-10843

CORROSION CONTROL ON BOREHOLE WATER PUMPS,
Water Planning for Israel Ltd., Tel-Aviv.
M. Unz.
Materials Protection and Performance, Vol 13, No 12, p 40-45, December 1973. 5 fig, 2 tab, 4 ref.

Descriptors: *Corrosion control, Cathodic protection, Saline water, Coatings, *Pumps, Chemical reactions, Casings, Columns.
Identifiers: *Borehole water pumps, *Israel.

Equipment service life, and protection methods used in Israel to combat corrosion on borehole water pumps are discussed. An effective corrosion control program is considered to consist of the following parts: water evaluation; proper pump protection; proper column protection; proper casing configuration; and, a corrosivity grading procedure. Water evaluation should determine any potential chemical corrosive agent such as chloride, hydrogen sulfide, or free carbon dioxide. In addition to the chemical composition of the water, the prevailing physical conditions such as temperature, amount of solute, and hydraulic conditions should be considered. Pump protection consists of proper hydraulic design, a system of corrosion resistant materials, and proper coatings. The outer sides of the columns that are commonly submerged in groundwater are often subjected to corrosive currents produced by an oxygen cell at the water line. To prevent galvanic corrosion of this type, the column should be either partially or completely coated, depending on the depth of the pump. If sufficient clearance is not maintained between pump and casing, and the two come into contact, a galvanic circuit will close and corrosion may begin. Corrosivity grading should be based on the particular chemical agents of the region. (Martino-NWWA)
W74-10844

APPLICATIONS OF INHOLE GEOPHYSICAL LOGS IN VOLCANIC ROCKS, NEVADA TEST SITE,
Geological Survey, Denver, Colo.
R. D. Carroll.
The Geological Society of America, Memoir 110, p 125-134, 1968. 6 fig, 5 ref.

Descriptors: *Borehole geophysics, *Well logging, Electrical well logging, Igneous rocks, Acoustics, *Nevada.
Identifiers: *Acoustic logging, *Inhole geophysical logs, Volcanic rocks, Electric logs.

Electric logs are the major qualitative tool in determining lithologic contacts in volcanic rocks at the Nevada Test Site. In one drill hole, only the electric log, of several geophysical logs, indicates the presence of the contact between an ash-flow tuff and a rhyolite. Acoustic logging devices, however, are most useful in the quantitative determination of rock properties. A relationship exists between sonic velocity and rock porosity in these volcanic rocks. Acoustic logs using full-wave recording techniques indicate that shear and Young's modulus values are related to rock velocity. Consequently, it may be possible to determine many of the engineering physical properties of certain rock types by using only a sonic log. (Csmpbell-NWWA)
W74-10846

THE CHANGE IN REACTIVITY OF SILICATE ANIONS DURING THE HYDRATION OF CALCIUM SILICATES AND CEMENT,
Central Research and Design Inst. for Silicate Industry, Budapest (Hungary).
For primary bibliographic entry see Field 8F.
W74-10859

CORROSION RESISTANT, NONMETALLIC WATER WELL SYSTEMS,
Radian Corp., Austin, Tex.
P. E. Hudson, and F. W. Nobles.
Available from the National Technical Information Service, Springfield, Va 22161 as AD-760 588, $6.00 in paper copy, $2.25 microfiche. Publication No AFWL-TR-72-146, 1973. 166 p, 71 fig, 19 tab, 12 ref, 1 append.

Descriptors: *Casings, *Well casings, Wells, *Pipes, *Plastic pipes, Physical properties, Corrosion control, Testing, *Strength of materials, Laboratory tests.
Identifiers: Tension tests, Biaxial compression, Point load, Uniform load, *Fiberglass reinforced pipe.

The use of fiberglass reinforced plastic pipe for water well applications was investigated. To carry out this investigation, a test program and test procedures were developed due to the unavailability of uniform test methods for plastic pipe for this application. The apparatus necessary for the test method program, including long and short term tension tests as well as biaxial, point and uniform load compression tests and combinations of these tests, was constructed and the tests performed on commercially available plastic pipe from several manufacturers. The results of these tests allow comparisons of the physical properties of the nine manufacturers' pipe tested. These data are compiled in such a manner that they can be utilized to design an optimum well system for any particular installation. (Staplin-NWWA)
W74-10863

REQUIREMENTS FOR THE MONITORING OF INDUSTRIAL DEEP-WELL WASTE-DISPOSAL SYSTEMS,
Dow Chemical Co., Houston, Tex.

For primary bibliographic entry see Field 5B.
W74-10867

8H. Rapid Excavation

TUNNELS--MACHINE EXCAVATION RATE OF PROGRESS--MACHINE DATA,
Bureau of Reclamation, Denver, Colo. Engineering and Research Center.
For primary bibliographic entry see Field 8E.
W74-10680

CAN DREDGING BE CONTINUED TO MAINTAIN GREAT LAKES,
Corps of Engineers, Chicago, Ill. North Central Div.
For primary bibliographic entry see Field 6D.
W74-10899

8I. Fisheries Engineering

PREPARATION AND PROPERTIES OF QUINALDINE SULFATE, AN IMPROVED FISH ANESTHETIC,
Bureau of Sport Fisheries and Wildlife, La Crosse, Wis. Fish Control Lab.
J. L. Allen, and J. B. Sills.
Bureau of Sport Fisheries and Wildlife, Investigations in Fish Control, No 47, April 1973. 5 p, 2 fig, 1 tab, 12 ref.

Descriptors: *Fish management, *Fish control agents, *Fisheries, *Fish physiology, Fish toxins, Chemical reactions, Fish handling facilities, Fish stocking, Methodology, Sulfates.
Identifiers: *Fish anesthesia, *Quinaldine sulfate, Fish handling.

The preparation of quinaldine salt and its chemical characterization are described for use as an anesthetic by fishery workers. The preparation of quinaldine sulfate (QdS04) from practical grade quinaldine and sulfuric acid yields a crystalline product which is water soluble and easily purified by recrystallization. The product conforms with the empirical formula C10H11NS04 and assays 99.4% pure by titration. The crystalline material has little odor and is water soluble; thus, it is less objectionable and much easier to handle than quinaldine for anesthetizing fish. The quinaldine sulfate was prepared from Eastman Kodak, 95% quinaldine. Two small batches of quinaldine sulfate were prepared by reacting 20 ml of quinaldine with 7.0 ml of concentrated sulfuric acid in the presence of a hydrocarbon solvent. (Woodard-USGS)
W74-10386

TOXICITY OF QUINALDINE SULFATE TO FISH,
Bureau of Sport Fisheries and Wildlife, La Crosse, Wis. Fish Control Lab.
For primary bibliographic entry see Field 5C.
W74-10387

THE EFFICACY OF QUINALDINE SULFATE AS AN ANESTHETIC FOR FRESHWATER FISH,
Bureau of Sport Fisheries and Wildlife, Washington, D.C.
P. A. Gilderhus, B. L. Berger, J. B. Sills, and P. D. Harman.
Bureau of Sport Fisheries and Wildlife, Investigations in Fish Control, No 49, April 1973. 7 p, 6 tab, 7 ref.

Descriptors: *Fish management, *Fish control agents, *Fish physiology, *Toxicity, Chemical reactions, Water properties, Freshwater fish, Analytical techniques, Water temperature, Hydrogen ion concentration.
Identifiers: *Fish anesthesia, *Quinaldine sulfate, Fish handling.

Quinaldine sulfate (QdS04), an improved formulation of the fish anesthetic quinaldine, was tested for its efficacy on 15 species of freshwater fish. The new crystalline formulation is water soluble and easier to use than practical grade quinaldine. QdS04 anesthetizes most salmonids at 25 mg/liter in less than 4 minutes and the fish recover in 1 to 13 minutes in fresh water. The effective concentrations for several warmwater species varied from 15 mg/liter for bluegills to 60 mg/liter for channel catfish. Fish were held for up to 60 minutes in effective concentrations without suffering mortalities. The efficacy of the anesthetic was little affected by water temperature, but the compound lowers the pH of some soft waters to below 6, the point at which it becomes ineffective as an anesthetic. All fish retained some reflex action and thus, some large fish were difficult to handle. (Woodard-USGS)
W74-10388

RESIDUE OF QUINALDINE IN TEN SPECIES OF FISH FOLLOWING ANESTHESIA WITH QUINALDINE SULFATE,
Bureau of Sport Fisheries and Wildlife, La Crosse, Wis. Fish Control Lab.
For primary bibliographic entry see Field 5C.
W74-10389

PHASE II: TEMPERATURE REQUIREMENTS OF SALMONIDS IN RELATION TO THEIR FEEDING, BIOENERGETICS, GROWTH AND BEHAVIOR,
Oregon State Univ., Corvallis. Dept. of Fisheries and Wildlife.
For primary bibliographic entry see Field 5C.
W74-10394

WATER INTAKE SCREEN,
FMC Corp., San Jose, Calif. (assignee)
R. G. Hughes, and W. M. Evard.
US Patent No 3,802,565, 5 p, 9 fig, 7 ref; Official Gazette of the United States Patent Office, Vol 921, No 2, p 592, April 9, 1974.

Descriptors: *Patents, *Fish barriers, Equipment, Flotsam, *Screens.
Identifiers: *Water screens, *Traveling water screens, Fisheries engineering.

A traveling intake water screen installation for removing debris and fish from a flowing stream of water includes a screen movable through a vertically closed loop. The screen is suspended from a pair of dual material head sprockets and comprises multiple screen trays interconnected by endless dual material side chains. Each screen tray has flexible end closure plates for preventing passage of debris around the sides of the screen. (Sinha-OEIS)
W74-10446

EFFECTS OF ACUTE COLD SHOCK ON THE CHANNEL CATFISH, ICTALURUS PUNCTATUS,
Battelle-Pacific Northwest Labs., Richland, Wash.
For primary bibliographic entry see Field 5C.
W74-10785

BACTERIOLOGICAL SURVEYS, CHARLOTTE COUNTY, NEW BRUNSWICK, SHELLFISH AREA N.B. 13, 1973,
Environmental Protection Service, Ottawa (Ontario). Water Pollution Control Directorate.
For primary bibliographic entry see Field 5C.
W74-10786

BACTERIOLOGICAL SURVEYS, CHARLOTTE COUNTY, NEW BRUNSWICK, SHELLFISH AREA N.B. 14, 1973,
Environmental Protection Service, Ottawa (Ontario). Water pollution Control Directorate.
For primary bibliographic entry see Field 5C.
W74-10787

BACTERIOLOGICAL SURVEYS, CHARLOTTE COUNTY, NEW BRUNSWICK, SHELLFISH AREAS N.B. 9, 10, 11, AND 12, 1973,
Environmental Protection Service, Ottawa (Ontario). Water Pollution Control Directorate.
For primary bibliographic entry see Field 5C.
W74-10788

ADDITIONS TO THE WEST VIRGINIA ICHTHYOFAUNA, WITH COMMENTS ON THE DISTRIBUTION OF OTHER SPECIES,
Virginia Polytechnic Inst. and State Univ., Blacksburg. Dept. of Biology.
For primary bibliographic entry see Field 2H.
W74-10800

10. SCIENTIFIC AND TECHNICAL INFORMATION

10B. Reference and Retrieval

DEVELOPMENT OF A PROTOTYPE SEARCH AND RETRIEVAL NETWORK FOR WATER RESOURCE INFORMATION AND USER EVALUATION SURVEY,
Oklahoma Univ., Norman. Office of Research Administration.
J. L. Morrison, L. G. Greenwell, R. Evans, and J. Freiden.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-234 335, $3.25 in paper copy, $2.25 in microfiche. Completion Report, April 15, 1974, 37 p. (WRSIC Retrieval System Report No 2). OWRR W-174(1).

Descriptors: *Information retrieval, *Networks, Data storage and retrieval, *Evaluation, *Information exchange.
Identifiers: Data retrival system, *Information user studies, *Information network evaluation.

Users generally were favorable to the WRSIC system; they also rated the system well in terms of 'ease of use' and 'applicability'. User attitude toward the overall data base was slightly lower. While respondents rated the data base high in terms of 'accuracy,' they rated it relatively low in 'completeness.' The majority of the respondents agreed that nothing should be eliminated from the data base. When formulating their last WRSIC search, half of the users spent less than two hours and only a few spent more than five hours. As an alternative scarch means, half of the users said they would have used a traditional library approach; many others suggested 'water resources abstracting services' as their alternative device. Users rated the network centers high on all attributes; especially 'helpfulness.' While half of the participants considered the turnaround time to be 'satisfactory,' nearly all respondents thought the turnaround time should be less than 14 days. About one-third of the samples first became aware of the WRSIC system by 'word of mouth/through association.' For the most part, respondents agreed that the system would be most beneficial to researchers and engineers. When asked what could be done to make the system better for the user, respondents regularly pointed out 'key word definitions' and 'more information about the data base/contents.' The most encouraging finding was that over 75% of the respondents expressed positive intentions to use the WRSIC system in the future. (See also W74-02821.)
W74-10412

10D. Specialized Information Center Services

SALINE GROUNDWATERS PRODUCED WITH OIL AND GAS,
Bureau of Mines, Bartlesville, Okla. Bartlesville Energy Research Center.
For primary bibliographic entry see Field 5A.
W74-10411

INFORMATION STORAGE AND RETRIEVAL SYSTEM FOR WELL HYDROGRAPH DATA USER'S MANUAL,
Battelle-Pacific Northwest Lab., Richland, Wash. Water and Land Resources Dept.
For primary bibliographic entry see Field 04B.
W74-10442

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ABSTRACT SOURCES

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A. Centers of Competence		
Colorado State University, Irrigation Return Flow Quality	W74-10739 -- 10761 10879 -- 10881 10883	27
Cornell University, Policy Models for Water Resources Systems	W74-10597, 10600 10602 -- 10603	4
Franklin Institute (FIRL), Municipal Wastewater Treatment Technology	W74-10447 -- 10499 10528 10551 -- 10576 10605 -- 10615 10813 -- 10825 10884 -- 10900	121
National Water Well Association, Water Well Construction Technology	W74-10826 -- 10829 10831 -- 10873	47
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B. State Water Resources Research Institutes		
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Oregon Water Resources Research Institute	W74-10394	1

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Ocean Engineering Information Service (Patents)	W74-10445 -- 10446 10577 -- 10580 10583 -- 10596	20
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CENTERS OF COMPETENCE AND THEIR SUBJECT COVERAGE

- Ground and surface water hydrology at the Water Resources Division of the U. S. Geological Survey, U. S. Department of the Interior.
- Metropolitan water resources planning and management at the Center for Urban and Regional Studies of University of North Carolina.
- Eastern United States water law at the College of Law of the University of Florida.
- Policy models of water resources systems at the Department of Water Resources Engineering of Cornell University.
- Water resources economics at the Water Resources Center of the University of Wisconsin.
- Eutrophication at the Water Resources Center of the University of Wisconsin.
- Water resources of arid lands at the Office of Arid Lands Studies of the University of Arizona.
- Water well construction technology at the National Water Well Association.
- Water-related aspects of nuclear radiation and safety at the Oak Ridge National Laboratory.
- Water resource aspects of the pulp and paper industry at the Institute of Paper Chemistry.

Supported by the Environmental Protection Agency in cooperation with WRSIC

- Effect on water quality of irrigation return flows at the Department of Agricultural Engineering of Colorado State University.
- Agricultural livestock waste at East Central State College, Oklahoma.
- Municipal wastewater treatment technology at the Franklin Institute Research Laboratories.

Subject Fields

1 NATURE OF WATER

2 WATER CYCLE

3 WATER SUPPLY AUGMENTATION AND CONSERVATION

4 WATER QUANTITY MANAGEMENT AND CONTROL

5 WATER QUALITY MANAGEMENT AND PROTECTION

6 WATER RESOURCES PLANNING

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